Vol. 1121 Number 2

OFFICIAL GAZETTE

of the

UNITED STATES PATENT AND TRADEMARK OFFICE

Route to:

1790 ***Celebrating 200 Years of Creativity*** 1990

PATENTS

December 11, 1990

U.S. DEPARTMENT OF COMMERCE

Patent and Trademark Office

PUBLISHED WEEKLY BY AUTHORITY OF CONGRESS

OFFICIAL GAZETTE of the
UNITED STATES PATENT AND TRADEMARK OFFICE

December 11, 1990 Volume 1121 Number 2

CONTENTS

	Page
Patent and Trademark Office Notices	
Patent Cooperation Treaty (PCT) Information	1121 OG 14
Notice of Maintenance Fees Payable	1121 OG 14
Notice of Expiration of Patents Due to Failure to Pay Maintenance Fees	1121 OG 15
Notification of Acceptance of Delayed Payment of Maintenance Fee	1121 OG 17
Reissue Applications Filed	1121 OG 17
Requests for Reexaminations Filed	1121 OG 17
Service by Publication	1121 OG 18
Errata	1121 OG 18
Removal From Register	1121 OG 18
Registration to Practice	1121 OG 22
Patent Term Extended Under 35 U.S.C. 156	1121 OG 22
Registration to Practice	1121 OG 22
Patents Available for License or Sale	1121 OG 22
Special Boxes for Mail	1121 OG 24
Reference Collections of U.S. Patents Available for Public Use in Patent Depository Libraries	1121 OG 25
Condition of Patent Applications	1121 OG 27
Reexaminations	621
Reissue Patents Granted (33,478)	623
Plant Patents Granted (7,390)	631
Patents Granted	
General and Mechanical (4,975,980)	633
Chemical (4,976,741)	891
Electrical (4,977,295)	1051
Design Patents Granted (312,719)	1165
Index of Patentees	PI 1
Indices of Reissue, Reexamination, Design, and Plant Patentees	PI 68
Classification of	
Patents (Including Reissues, and Reexaminations)	PI 75
Designs, and Plants Applications	PI 79
Geographical Index of Residence of Inventors	
Patents (Including Reissues and Reexaminations)	PI 81
Designs and Plant Applications	PI 83
Change of Address Form and Subscription Order Form	Back Page

The following are mailed under direction of the Superintendent of Documents, Government Printing Office, Washington, D.C., 20402, to whom all subscriptions should be made payable and all communications addressed.

THE OFFICIAL GAZETTE (PATENT SECTION), issued weekly.
THE OFFICIAL GAZETTE (TRADEMARK SECTION), issued weekly.
GENERAL INFORMATION concerning PATENTS.
GENERAL INFORMATION concerning TRADEMARKS.

COPIES OF PATENTS are furnished by the Patent and Trademark Office at $1.50 each; PLANT PATENTS in color, $10.00 each; copies of TRADEMARKS at $1.50 each. Address orders to the Commissioner of Patents and Trademarks, Washington, D.C., 20231.

Printing authorized by Section 11(a)3 of Title 35, U.S. P.T.O.

[26] In the case of a suggestion for rehearing en banc, we obtain approval from the Solicitor General.

PATENT AND TRADEMARK OFFICE NOTICES

Patent Cooperation Treaty (PCT) Information

For information concerning the PCT member countries see the notice appearing in the *Official Gazette* at 1118 O.G. 14 on Sept. 11, 1990.

For use of the European Patent Office as an International Searching Authority for international applications filed in the United States Receiving Office, see the notice appearing in the *Official Gazette* at 1022 O.G. 52 on Sept. 28, 1982.

For use of the European Patent Office as an International Preliminary Examining Authority for international applications filed in the United States Receiving Office, see the notices appearing in the *Official Gazette* at 1080 O.G. 2 on July 7, 1987 and at 1091 O.G. 2 on June 7, 1988. There is no longer a limit on the number of such international applications accepted for international preliminary examination by the European Patent Office; see the notice appearing at 1116 O.G. 32, on July 17, 1990.

The search fee of the European Patent Office was changed due to a difference in the exchange rate of the U.S. dollar in relation to the German Mark as of Nov. 1, 1990, and was announced in the *Official Gazette* at 1119 O.G. 54 on Oct. 23, 1990.

International fees were changed on September 1, 1990 due to a difference in the exchange rate of the U.S. dollar in relaton to the Swiss Franc and were announced in the *Official Gazette* at 1116 O.G. 32 on July 17, 1990.

Certain domestic PCT fees and charges for International Search and Preliminary Examination have been changed effective Apr. 17, 1989 and were announced in the *Official Gazette* at 1100 O.G. 24 on Mar. 7, 1989.

The current schedule of PCT fees (in U.S. dollars) is as follows:

Transmittal fee:	170.00
Search Fee	
U.S. Patent and Trademark Office (USPTO) as International Searching Authority (ISA)	
—No corresponding prior U.S. national application filed	550.00
—Corresponding prior U.S. national application filed	380.00
—Supplemental search fee, per additional invention	150.00
European Patent Office as ISA	1344.00
Preliminary examination fee	
USPTO as International Preliminary Examining Authority (IPEA)	
—Search fee paid to USPTO as ISA.	400.00
—Additional examination fee, per additional invention	130.00
—ISA not the USPTO	600.00
—Additional examination fee, per additional invention	200.00
International fees	
Basic fee	502.00
Basic Supplemental fee (for each page over 30)	10.00
Designation fee per country or region for the first 10 national or regional offices	122.00
Designation fee for 11th and subsequent designations	No Charge
Handling fee	154.00

U.S. National Stage fees

	Small Entity	Regular
USPTO was IPEA	165.00	330.00
USPTO was ISA but not IPEA	185.00	370.00
USPTO was neither ISA nor IPEA	250.00	500.00
USPTO was IPEA and all claims presented satisfied provisions of PCT Article 33(2) to (4)	25.00	50.00
—For each independent claim in excess of 3	18.00	36.00
—For each claim in excess of 20	6.00	12.00
—For each application containing a multiple dependent claim	60.00	120.00
—Surcharge for filing national fee or oath or declaration after the time limit applicable under PCT Article 22 or 39(1)	60.00	120.00
—Processing fee for filing English translation after the time limit applicable under PCT Article 22 or 39(1)	30.00	30.00

Sept. 24, 1990 HARRY F. MANBECK, Jr.
Assistant Secretary and Commissioner of Patents and Trademarks.

Notice of Maintenance Fees Payable

Title 37, Code of Federal Regulations, Section 1.362(d), effective Nov. 1, 1984, provides that maintenance fees may be paid without surcharge for a six-month period beginning 3, 7, and 11 years after the date of issue of patents based on application filed on or after Dec. 12, 1980. An additional six-month grace period is provided by 35 U.S.C. 41(b) and 37 CFR 1.362(e) for payment of the maintenance fee with the surcharge set forth in 37 CFR 1.20(k) or (l), as amended effective Apr. 17, 1989. If the maintenance fee is not paid in a patent requiring such payment the patent will expire on the 4th, 8th or 12th anniversary of the patent.

Attention is drawn to the patents which were issued on December 8, 1987 for which maintenance fees due at 3 years and six months may now be paid. The patents have patent numbers within the following ranges:

Utility Patents 4,710,977 through 4,712,250
Reissue Patents based on the above identified patents.

Attention is drawn to the patents which were issued on December 6, 1983 for which maintenance fees due at 7 years and six months may now be paid. The patents have patent numbers within the following ranges:

Utility Patents 4,418,431 through 4,419,770
Reissue Patents based on the above identified patents.

No maintenance fees are required for design or plant patents.

Payments of maintenance fees in patents should be directed to "Commissioner of Patents and Trademarks, Box M. Fee, Washington, D.C. 20231."

The current amounts of the maintenance fees due at 3 years and six months and seven years and six months are set forth in 37 CFR 1.20(e), and (f), as amended effective Apr. 17, 1989, and in 37 CFR 1.20(h) and (i), as amended Nov. 5, 1990, which are reproduced below:

37 CFR § 1.20 Post-issuance fees and surcharges

"(e) For maintaining an original or reissue patent, except a design or plant patent, based on an application filed on or after after Dec. 12, 1980 and before Aug. 27, 1982, in force beyond 4 years; the fee is due by three years and six months after the original grant.....$245.00

"(f) For maintaining an original or reissue patent, except a design or plant patent, based on an application filed on or after Dec. 12, 1980 and before Aug. 27, 1982, in force beyond 8 years; the fee is due by seven years and six months after the original grant.....$495.00"

"(h) For maintaining an original or reissue patent except a design or plant patent, based on an application filed on or after Aug. 27,1982, in force beyond 4 years; the fee is due by three years and six months after the original grant:

By a small entity (§1.9(f)).....$415.00
By other than a small entity.....$850.00"

"(i) For maintaining an original or reissue patent, except a design or plant patent, based on an application filed on or after Aug. 27, 1982, in force beyond 8 years; the fee is due by seven years and six months after the original grant:

By a small entity (§1.9(f)).....$835.00
By other than a small enttity.....$1670.00"

The amounts of the surcharges for paying the maintenance fee during the grace period or after the expiration of the patent are set forth in 37 CFR 1.20(k), (l) and (m), as amended effective Apr. 17, 1989, which are reproduced below:

"(k) Surcharge for paying a maintenance fee during the 6-month grace period following the expiration of three years and six months , seven years and six months, and eleven years and six months after the date of the original grant of a patent based on an application filed on or after Dec. 12, 1980 and before Aug. 27,1982.....$120.00"

"(l) Surcharge for paying a maintenance fee during the 6-month grace period following the expiration of three years and six months, seven years and six months, and eleven years and six months after the date of the original grant of a patent based on an application filed on or after Aug. 27, 1982:

By a small entity(§1.9(f)).....$60.00
By other than a small entity.....$120.00"

"(m) Surcharge for accepting a maintenance fee after expiration of a patent for non-timely payment of a maintenance fee where the delay is shown to the satisfaction of the Commissioner to have been unavoidable.....$550.00"

Notice of Expiration of Patents Due to Failure to Pay Maintenance Fees

35 U.S.C. 41 and 37 CFR 1.362(g) provide that if the required maintenance fee and any applicable surcharge are not paid in a patent requiring such payment, the patent will expire at the end of the 4th, 8th, or 12th anniversary of the grant of the patent depending on the first maintenance fee which was not paid.

According to the records of the Office, the patents listed below have expired due to failure to pay the required maintenance fee and any applicable surcharge.

PATENTS WHICH EXPIRED SEPTEMBER 30, 1990 DUE TO FAILURE TO PAY MAINTENANCE FEES

Patent Number	Serial Number	Issue Date
4,351,071	06/230,538	9/28/82
4,351,111	06/241,421	9/28/82
4,351,117	06/224,888	9/28/82
4,351,126	06/223,243	9/28/82
4,351,128	06/233,914	9/28/82
4,351,134	06/240,376	9/28/82
4,351,145	06/230,865	9/28/82
4,351,163	06/317,463	9/28/82
4,351,197	06/294,225	9/28/82
4,351,264	06/222,754	9/28/82
4,351,265	06/235,973	9/28/82
4,351,272	06/244,005	9/28/82
4,351,273	06/226,914	9/28/82
4,351,277	06/227,812	9/28/82
4,351,302	06/301,272	9/28/82
4,351,311	06/283,935	9/28/82
4,351,312	06/230,544	9/28/82
4,351,346	06/240,853	9/28/82
4,351,347	06/311,145	9/28/82
4,351,371	06/260,310	9/28/82
4,351,403	06/242,037	9/28/82
4,351,438	06/224,056	9/28/82
4,351,443	06/264,012	9/28/82
4,351,458	06/232,563	9/28/82
4,351,471	06/228,862	9/28/82
4,351,497	06/233,102	9/28/82
4,351,525	06/236,830	9/28/82
4,351,554	06/302,173	9/28/82
4,351,565	06/245,807	9/28/82
4,351,622	06/218,701	9/28/82
4,351,638	06/304,042	9/28/82
4,351,647	06/272,418	9/28/82
4,351,658	06/215,574	9/28/82
4,351,664	06/244,024	9/28/82
4,351,681	06/264,475	9/28/82
4,351,694	06/311,520	9/28/82
4,351,701	06/224,405	9/28/82
4,351,708	06/236,463	9/28/82
4,351,725	06/229,836	9/28/82
4,351,726	06/250,647	9/28/82
4,351,737	06/277,909	9/28/82
4,351,742	06/256,903	9/28/82
4,351,761	06/231,891	9/28/82
4,351,762	06/242,310	9/28/82
4,351,763	06/256,861	9/28/82
4,351,767	06/278,838	9/28/82
4,351,777	06/304,627	9/28/82
4,351,805	06/251,591	9/28/82
4,351,806	06/266,249	9/28/82
4,351,808	06/225,914	9/28/82
4,351,838	06/233,707	9/28/82
4,351,857	06/294,095	9/28/82
4,351,867	06/247,669	9/28/82
4,351,888	06/288,612	9/28/82
4,351,895	06/312,450	9/28/82
4,351,905	06/216,310	9/28/82
4,351,919	06/310,370	9/28/82
4,351,965	06/305,469	9/28/82
4,352,024	06/260,231	9/28/82
4,352,056	06/220,207	9/28/82
4,352,071	06/262,662	9/28/82
4,352,082	06/238,018	9/28/82
4,352,087	06/256,386	9/28/82
4,352,133	06/236,970	9/28/82
4,352,137	06/237,867	9/28/82
4,352,144	06/226,583	9/28/82
4,352,146	06/281,819	9/28/82
4,352,147	06/232,099	9/28/82
4,352,154	06/238,335	9/28/82
4,352,182	06/215,796	9/28/82
4,352,202	06/234,467	9/28/82
4,352,209	06/242,908	9/28/82
4,613,991	06/810,561	9/30/86
4,613,992	06/737,470	9/30/86
4,613,993	06/686,913	9/30/86
4,613,998	06/603,488	9/30/86
4,613,999	06/580,874	9/30/86
4,614,000	06/622,111	9/30/86
4,614,007	06/771,254	9/30/86
4,614,008	06/777,588	9/30/86
4,614,033	06/605,617	9/30/86
4,614,041	06/727,086	9/30/86
4,614,045	06/724,683	9/30/86

Patent Number	Serial Number	Issue Date
4,614,046	06/705,002	9/30/86
4,614,048	06/799,256	9/30/86
4,614,050	06/625,128	9/30/86
4,614,053	06/597,039	9/30/86
4,614,054	06/725,905	9/30/86
4,614,055	06/604.227	9/30/86
4,614,056	06/693,335	9/30/86
4.614,057	06/752,775	9/30/86
4,614,058	06/747,960	9/30/86
4,614,059	06/750,936	9/30/86
4,614,060	06/488,719	9/30/86
4,614,066	06/806,425	9/30/86
4,614,068	06/653,611	9/30/86
4,614,070	06/576,737	9/30/86
4,614,071	06/552,362	9/30/86
4,614,073	06/730,288	9/30/86
4,614,085	06/691,691	9/30/86
4,614,089	06/713,617	9/30/86
4,614,094	06/514,240	9/30/86
4,614,097	06/824,304	9/30/86
4,614,106	06/733,261	9/30/86
4,614,108	06/722,655	9/30/86
4,614,128	06/522,226	9/30/86
4,614,130	06/680,384	9/30/86
4,614,131	06/668,417	9/30/86
4,614,134	06/622,544	9/30/86
4,614,168	06/724,831	9/30/86
4,614,178	06/750,983	9/30/86
4,614,181	06/669,205	9/30/86
4,614,186	06/672,802	9/30/86
4,614,195	06/683,071	9/30/86
4,614,213	06/616,391	9/30/86
4,614,214	06/714,202	9/30/86
4,614,220	06/672,237	9/30/86
4,614,237	06/787,466	9/30/86
4,614,239	06/687,873	9/30/86
4,614,240	06/689,482	9/30/86
4,614,241	06/580,602	9/30/86
4,614,252	06/795,887	9/30/86
4,614,253	06/612,343	9/30/86
4,614,266	06/743,825	9/30/86
4,614,269	06/726,985	9/30/86
4,614,270	06/649,582	9/30/86
4,614,272	06/606,799	9/30/86
4,614,281	06/801,464	9/30/86
4,614,282	06/761,430	9/30/86
4,614,289	06/731,635	9/30/86
4,614,292	06/781,987	9/30/86
4,614,308	06/623,568	9/30/86
4,614,322	06/657,976	9/30/86
4,614,328	06/670,467	9/30/86
4,614,336	06/695,057	9/30/86
4,614,338	06/665,716	9/30/86
4,614,339	06/600,505	9/30/86
4,614,345	06/715,174	9/30/86
4,614,350	06/792,640	9/30/86
4,614,353	06/737,325	9/30/86
4,614,354	06/716,366	9/30/86
4,614,355	06/614,145	9/30/86
4,614,356	06/779,230	9/30/86
4,614,357	06/626,771	9/30/86
4,614,359	06/714,526	9/30/86
4,614,361	06/585,155	9/30/86
4,614,373	06/567,759	9/30/86
4,614,376	06/577,701	9/30/86
4,614,378	06/724,671	9/30/86
4,614,381	06/612.941	9/30/86
4,614,385	06/679,892	9/30/86
4,614,393	06/621,330	9/30/86
4,614,401	06/503,165	9/30/86
4,614,404	06/613,793	9/30/86
4,614,412	06/675,074	9/30/86
4,614,414	06/721,446	9/30/86
4,614,422	06/717,722	9/30/86
4,614,426	06/549,554	9/30/86
4,614,431	06/580,709	9/30/86
4,614,436	06/701,174	9/30/86
4,614,439	06/751,398	9/30/86
4,614,446	06/729,674	9/30/86
4,614,447	06/623,241	9/30/86
4,614,454	06/688,619	9/30/86
4,614,458	06/622,861	9/30/86
4,614,459	06/758,628	9/30/86
4,614,468	06/680,639	9/30/86
4,614,471	06/593,812	9/30/86
4,614,476	06/538,382	9/30/86
4,614,484	06/678,717	9/30/86
4,614,492	06/701,119	9/30/86
4,614,496	06/657,026	9/30/86
4,614,502	06/710,629	9/30/86
4,614,504	06/755,116	9/30/86
4,614,511	06/708,952	9/30/86
4,614,513	06/639,727	9/30/86
4,614,518	06/473,335	9/30/86
4,614,523	06/689,670	9/30/86
4,614,532	06/730,393	9/30/86
4,614,535	06/669,620	9/30/86
4,614,536	06/650,338	9/30/86
4,614,537	06/545,472	9/30/86
4,614,562	06/639,763	9/30/86
4,614,563	06/760,034	9/30/86
4,614,567	06/752,183	9/30/86
4,614,577	06/686,837	9/30/86
4,614,583	06/712,627	9/30/86
4,614,584	06/700,808	9/30/86
4,614,586	06/426,276	9/30/86
4,614,591	06/679,046	9/30/86
4,614,597	06/682,670	9/30/86
4,614,610	06/589,506	9/30/86
4,614,611	06/698,861	9/30/86
4,614,615	06/723,309	9/30/86
4,614,620	06/702,633	9/30/86
4,614,631	06/672,873	9/30/86
4,614,639	06/727,937	9/30/86
4,614,652	06/651,608	9/30/86
4,614,671	06/555,706	9/30/86
4,614,686	06/516,096	9/30/86
4,614,688	06/668,778	9/30/86
4,614,703	06/666,863	9/30/86
4,614,704	06/747,478	9/30/86
4,614,717	06/706,519	9/30/86
4,614,720	06/432,457	9/30/86
4,614,724	06/562,862	9/30/86
4,614,729	06/665,239	9/30/86
4,614,739	06/745,884	9/30/86
4,614,741	06/622,423	9/30/86
4,614,743	06/566,093	9/30/86
4,614,744	06/631,825	9/30/86
4,614,745	06/722,632	9/30/86
4,614,750	06/779,218	9/30/86
4,614,753	06/830,055	9/30/86
4,614,755	06/745,786	9/30/86
4,614,757	06/796,310	9/30/86
4,614,759	06/762,601	9/30/86
4,614,762	06/620,977	9/30/86
4,614,764	06/708,911	9/30/86
4,614,783	06/591,590	9/30/86
4,614,792	06/742,412	9/30/86
4,614,811	06/713,178	9/30/86
4,614,820	06/829,468	9/30/86
4,614,830	06/764,163	9/30/86
4,614,831	06/771,820	9/30/86
4,614,836	06/591,106	9/30/86
4,614,837	06/719,789	9/30/86
4,614,838	06/558,766	9/30/86
4,614,840	06/663,273	9/30/86
4,614,844	06/633,250	9/30/86
4,614,845	06/634,277	9/30/86
4,614,848	06/731,386	9/30/86
4,614,850	06/676,825	9/30/86
4,614,857	06/699,471	9/30/86
4,614,859	06/672,306	9/30/86
4,614,860	06/716,419	9/30/86
4,614,863	06/650,173	9/30/86
4,614,865	06/552,479	9/30/86
4,614,870	06/558,378	9/30/86

Patent Number	Serial Number	Issue Date
4,614,875	06/697,040	9/30/86
4,614,879	06/645,628	9/30/86
4,614,886	06/491,596	9/30/86
4,614,887	06/679,915	9/30/86
4,614,900	06/730,070	9/30/86
4,614,910	06/757,847	9/30/86
4,614,913	06/605,544	9/30/86
4,614,939	06/598,029	9/30/86
4,614,942	06/533,151	9/30/86
4,614,963	06/552,867	9/30/86
4,614,988	06/553,458	9/30/86
4,614,997	06/675,723	9/30/86
4,615,025	06/638,592	9/30/86
4,615,027	06/473,166	9/30/86
4,615,043	06/685,295	9/30/86
4,615,044	06/536,865	9/30/86

NOTIFICATION OF ACCEPTANCE OF DELAYED PAYMENT OF MAINTENANCE FEE (35 U.S.C. 41(c); 37 CFR 1.378)

The patent(s) listed below are considered as not having expired but are subject to the conditions set forth in 35 U.S.C. 41(c)(2), in view of the Petition to Accept Late Payment of the maintenance fees which has been GRANTED BY THE COMMISSIONER OF PATENTS AND TRADEMARKS, as provided for under 35 U.S.C. 41(c)(1), and 37 CFR 1.378.

Patent No.	Serial No.	Patent Date	Application Filing Date	Delayed Payment Acceptence Date
4,413,211	06/333,637	11/01/83	12/23/81	10/31/90
4,430,576	06/318,393	2/07/84	11/05/81	10/31/90

REISSUE APPLICATIONS FILED

Notice under 37 CFR 1.11(b). The reissue applications listed below are open to inspection by the general public in the indicated Examining Groups and copies may be obtained by paying the fee therefor (37 CFR 1.21(b).

4,701,510, Re. S. N. 07/604,990, Filed Oct. 29, 1990, Cl. 526, POLYCYCLOOLEFINS RESISTANT TO SOLVENTS, Robert Minchak, et al., Owner of Record: *The BF Goodrich Co., New York, N.Y.*, Attorney or Agent: Frank Robbins, Ex. Gp.: 157

4,769,786, Re. S. N. 07/606,809, Filed Oct. 30, 1990, Cl. 365/182, TWO SQUARE MEMORY CELLS, Richard Garnache, Owner of Record: *International Business Machines Corp., Armonk, N.Y.*, Attorney or Agent: Mark F. Chadurjian, Ex. Gp.: 233

4,780,179, Re. S. N. 07/600,012, Filed Oct. 18, 1990, Cl. 162/005, METHOD FOR PRODUCING PULP FROM PRINTED UNSELECTED WASTE PAPER, Jean M. Clement, Owner of Record: *Inventor*, Attorney or Agent: Joseph S. Kentoffio, Ex. Gp.: 133

4,781,924, Re. S. N. 07/606,462, Filed Oct. 31, 1990, Cl. 424/449, TRANDERMAL DRUG DELIVERY DEVICE, Eun S. Lee, et al., Owner of Record: *Alza Corp., Palo Alto, Calif.*, Attorney or Agent: Herbert H. Mintz, Ex. Gp.: 152

4,782,459, Re. S. N. 07/605,844, Filed Oct. 30, 1990, CL. 364/724.19, ADAPTIVE RECOGNIZING DEVICE, Robert D. Johnston, Owner of Record: *British Telecommunications Public Limited Co., London, England*, Attorney or Agent: Jeffry H. Nelson, Ex. Gp.: 231

4,786,764, Re. S. N. 07/583,805, Filed Sept. 17, 1990, Cl. 178/018, DIGITIZER STYLUS WITH PRESSURE TRANSDUCER, Michael J. Padula, et al., Owner of Record: *Summagraphics Corp., Fairfield, Conn.*, Attorney or Agent: J. David Dainow, Ex. Gp.: 261

4,788,711, Re. S. N. 07/481,964, Filed Feb. 16, 1990, Cl. 379/059, APPARATUS AND METHOD FOR A CELLULAR FREEWAY EMERGENCY TELEPHONE SERVICE, Philip G, Franklin, et al., Owner of Record: *Cellular Communications Corp., Irvine, Calif.*, Attorney or Agent: Robert A. Green, Ex. Gp.: 261

4,885,951, Re. S. N. 07/603,172, Filed Oct. 25, 1990, Cl. 74/502, IDEXATION CONTROL DEVICE FOR A CYCLE DERAILLEUR, Christian Desenclos, et al., Owner of Record: *Sachs Industries, Nanterre, France*, Attorney or Agent: Richard Bushnell, Ex. Gp.: 352

4,898,333, Re. S. N. 07/605,559, Filed Oct. 29, 1990, Cl. 239/657, HYDRAULIC SYSTEM FOR USE WITH SNOW-ICE REMOVAL VEHICLES, James A. Kime, et al., Owner of Record: *H.Y.O., Inc., Columbus, Ohio*, Attorney or Agent: Gerald L. Smith, Ex. Gp.: 314

4,904,542, Re. S. N. 07/606,243, Filed Oct. 31, 1990, Cl. 428/610, MULTI-LAYER WEAR RESISTANT COATINGS, Susan Mroczkowski, Owner of Record: *Midwest Research Technologies, Inc., Milwaukee, Wis.*, Attorney or Agent: George E. Haas, Ex. Gp.: 113

4,927,405, Re. S. N. 07/605,077, Filed Oct. 25, 1990, Cl. 493/194, PROTECTIVE LABORATORY SPECIMEN BAG, Kenneth W. Martin, et al., Owner of Record: *International Plastics, Inc., Greenville, S.C.*, Attorney or Agent: Cort Flint, Ex. Gp.: 323

4,932,789, Re. S. N. 07/605,589, Filed Oct. 29, 1990, Cl. 374/126, RADIATION CLINICAL THERMOMETER, Shunji Egawa, et al., Owner of Record: *Citizen Watch Co., Ltd., Tokyo, Japan*, Attorney or Agent: J. Georg Seka, Ex. Gp.: 246

REQUESTS FOR REEXAMINATION FILED

Notice under 37 CFR 1.11(c). The requests for reexamination listed below are open to inspection by the general public in the indicated Examining Groups. Copies of the requests and related papers may be obtained by paying the fee therefor established in the Rules (37 CFR 1.19(a)).

In the event correspondence to the patent owner is not received, this notice will be considered to be constructive notice to the patent owner and reexamination will proceed (37 CFR 1.248(a)(5) and 1.525(b).

4,074,324, Reexam. No. 90/002,187, Requested Oct. 31, 1990, Cl. 358/296, INSTANT ELECTRONIC CAMERA, Jon S. Barrett, Owner of Record: *Inventor, Sunnyvale, Calif.*, Attorney or Agent: None, Ex. Gp.: 216, Requester: Andrew J. Patch, Arlington, Va.

4,315,261, Reexam. No. 90/002,184, Requested Oct. 11, 1990, Cl. 343/018, RADAR SIGNAL DETECTOR, Richard K. Mosher, Owner of Record: *Controlonics Corp., Littleton, Mass.*, Attorney or Agent: Charles L. Gagnebin, Weingarten, Schurgin, Gagnebin & Hayes, Boston, Mass., Ex. Gp.: 222, Requester: Russell E. Hattis, Wallenstein, Wagner & Hattis, Chicago, Ill.

4,572,600, Reexam. No. 90/002,185, Requested Oct. 31, 1990, Cl. 339/014, ELECTRICAL CONNECTOR FOR TRANSIENT SUPPRESSION, Gerard R. Neiman, Owner of Record: *ITT Corp., New York, N.Y.*, Attorney or Agent: Thomas L. Peterson, ITT Corp., Santa Ana, Calif., Ex. Gp.: 322, Requester: Amphenol Corp., Wallingford, Conn.

4,600,262, Reexam. No. 90/002,186, Requested Oct. 31, 1990, Cl. 339/147, ELECTRICAL CONNECTOR EMBODYING ELECTRICAL CIRCUIT COMPONENTS, Gerard R. Neiman, Owner of Record: *ITT Corp., New York, N.Y.*, Attorney or Agent: Thomas R. Peterson, ITT Corp., Santa Ana, Calif., Ex. Gp.: 322, Requester: Amphenol Corp., Wallingford, Conn.

4,634,300, Reexam. No. 90/002,188, Requested Oct. 31, 1990, Cl. 384/548, ROTATING MEMBER SUPPORTING APPARATUS, Hiroaki Takebayashi, et al., Owner of Record: *Koyo Seiko Co., Ltd. & Kabushiki Kaisha Toshiba, Osaka & Kawasaki, Japan*, Attorney or Agent: Glenn J. Perry, Cushman, Darby & Cushman, Washington, D.C., Ex. Gp.: 245, Requester: Wenderoth, Lind & Ponack, Washington, D.C.

4,906,432, Reexam. No. 90/002,189, Requested Nov. 1, 1990, Cl. 422/063, LIQUID HANDLING, Theodore S. Geiselman, Owner of Record: *Fisher Scientific Corp., Pittsburgh, Pa.*, Attorney or Agent: Willis M. Ertman, Fish & Richardson, Boston, Mass., Ex. Gp.: 181, Requester: Owner

4,916,140, Reexam. No. 90/002,182, Requested Oct. 29, 1990, Cl. 514/299, ANTIPILEPTIC PYRAZOLOPYRIDINES, Michael G. Palfreyman, et al., Owner of Record: *Marion Merrell Dow, Inc., Cincinnati, Ohio*, Attorney or Agent: Michael J. Sayles, Cincinnati, Ohio, Ex. Gp.: 125, Requester: Owner

Service by Publication

A petition to cancel each of the registrations identified below having been filed, and the notice of such proceedings sent by certified mail to registrant at the last known address having been returned by the Postal Service as undeliverable, notice is hereby given that unless the registrants listed herein, their assigns or legal representatives shall enter an appearance within thirty days from the date of this publication, the cancellation will be proceeded with as in the case of default.

Club Sea, Inc., Fla., Reg. No. 1,451,374, for the mark "THE NEW WAVE IN CRUISING", Canc. No. 18,830.

Taj Mahal Foods, Inc., Ohio, Reg. No. 1,383,559, for the mark "IT'ZZA PIZZA", Canc. No. 18,855.

Ventura Investments, Inc., Monroe, Conn., Reg. No. 1,363,312, for the mark "THE BANK MONITOR" (Block Form), Canc. No. 18,638.

Scott E. Green, Doraville, Ga., Reg. No. 1,383,584, for the mark "YOGI", Canc. No. 18,750.

MCS Software, Salt Lake City, Utah, Reg. No. 1,295,878, for the mark "BANCSOFT", Canc. No. 18,816.

Hoffman Design, Inc., Agoura Hills, Calif., Reg. No. 1,342,088, for the mark "CONDOR", Canc. No. 18,819.

Sheepmates, Inc., New York, N.Y., Reg. No. 1,338,051, for the mark "WHOOZE?", Canc. No. 18,822.

The Guiltless Gourmet, Inc., Atlanta, Ga., Reg. No. 1,076,174, for the mark "GUILTLESS GOURMET", Canc. No. 18,792.

Crompton Co., Inc., New York, N.Y., Reg. No. 598,550, for the mark "ST. GERMAIN", Canc. No. 19,140.

JEAN BROWN
Administrator of the Trademark Trial and Appeal Board
For JEFFREY M. SAMUELS
Assistant Commissioner for Trademarks

Errata

"All reference to Patent No. 4,961,552 to Aneurin G. Bird et al. of Netherlands for `FAST EARTH RECOVERY PROCEDURE' appearing in the Official Gazette of Oct. 9, 1990 should be deleted since no patent was granted."

"All reference to Patent No. 4,941,292 to Boris Rudolf et al. of Germany for `DEVICE FOR CLAMPING A DISC-SHAPED TOOL' appearing in the Official Gazette of July 17, 1990 should be deleted since no patent was granted."

"All reference to Patent No. 4,948,037 to A.M. Van Den Hoogen Lambertus of Volkel, Netherlands, for `FLEXIBLE PLIABLE RETAINING PACKAGE FOR FLOWERS AND PLANTS' appearing in the Official Gazette of Aug. 14, 1990 should be deleted since no patent was granted."

"All reference to Patent No. 4,950,636 to Bryon J. Tarbert et al. of Orem, Utah for `SULFUR AND NITROGEN-CONTAINING HYDROCARBONS AND PROCESS OF USING SAME IN RECOVERING AND CONCENTRATING DESIRED IONS FROM SOLUTIONS THEREOF' appearing in the Official Gazette of Aug. 21, 1990 should be deleted since no patent was granted."

"All reference to Patent No. 4,960,645 to Philip J. Lingle et al. of Lambertville, Mich. for `HEAT TREATMENT SPUTTER-COATED GLASS' appearing in the Official Gazette of Oct. 2, 1990 should be deleted since no patent was granted."

"All reference to Patent No. 4,964,041 to Thomas L. Jeremiah of Endwell, N.Y. for `INTERRUPTIBLE CACHE LOADING' appearing in the Official Gazette of Oct. 16, 1990 should be deleted since no patent was granted."

"All reference to Patent No. 4,965,687 to Hideo Fujiwara of Japan for `MULTIHEAD MAGNETIC DISK DEVICE FOR A MAGNETIC DISK MEMORY' appearing in the Official Gazette of Oct. 23, 1990 should be deleted since no patent was granted."

"All reference to Patent No. 4,966,627 to Madapusi K. Keshavan of Calif. for `COMPOSITE CEMENTED CARBIDE' appearing in the Official Gazette of Oct. 30, 1990 should be deleted since no patent was granted."

"All reference to Patent No. 4,967,310 to Werner Erhardt of Germany for `BREAK-AWAY ELEMENT FOR ELECTRICAL CAPACITOR' appearing in the Official Gazette of Oct. 30, 1990 should be deleted since no patent was granted."

"All reference to Patent No. 4,970,327 to Antonio Longo et al. of Milan, Italy for `SYNTHESIS OF 6-METHYLENE DERIVATIVES OF ANDROSTA-1, 4-DIENE-3, 17-DIONE' appearing in the Official Gazette of Nov. 13, 1990 should be deleted since no patent was granted."

REMOVAL FROM REGISTER

Pursuant to 37 CFR § 10.11(b), a survey letter was directed on Jan. 31, 1990 to the last post office address furnished to the Office of Enrollment and Discipline by each of the persons whose name and address appear on the following list. With respect to some of the letters, no reply was received within the period of forty-five(45) days therein set. Other letters were returned by the Post Office with notations to the effect that the addressee was deceased, unknown, or had moved and left no forwarding address or the forwarding had expired.

Accordingly, the names of the following persons have been removed from the Register of Patent Attorneys and Agents.

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Registration to Practice

The following list contains the names of persons applying for registration to practice before the United States Patent and Trademark Office. Final approval for registration is subject to establishing to the satisfaction of the Director of the Office of Enrollment and Discipline that the person seeking registration is of good moral character and repute. [37 CFR 10.7(a)]. Accordingly, any information tending to affect the eligibility of any of the following applicants on moral, ethical, or other grounds should be furnished to the Director, Office of Enrollment and Discipline on or before January 25, 1991.

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Wise, Edward J., 7142 Sontag Way, Springfield, Va. 22153
Mitchell, Richard J., 38 Crichton St., Ottawa, Ont., K1M 1V4, Canada

Nov. 9, 1990 CAMERON WEIFFENBACH, *Director*
Office of Enrollment and Discipline

Patent Term Extended Under 35 USC 156

An interim extension of the term of U.S. Patent No. 3,737,433 has been granted under 35 U.S.C. 156(e)(2) for a period of one year from the original expiration date of the patent. The application for patent term extension was filed by the patent owner Hoechst Aktiengesellschaft based on FDA approval of the product "Trental™ (pentoxifylline)".

Registration to Practice

The following list contains the names of persons that passed the registration examination that was held on April 4, 1990. Final approval for registration is subject to establishing to the satisfaction of the Director of the Office of Enrollment and Discipline that the person seeking registration is of good moral character and repute. [37 CFR 10.7(a)]. Accordingly, any information tending to affect the eligibility of any of the following applicants on moral, ethical, or other grounds should be furnished to the Director, Office of Enrollment and Discipline on or before January 25, 1991.

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Pawlak-Byczkowska, Elizabeth J., 7534 Mandan Rd., Greenbelt, Md. 20770

Nov. 9, 1990 CAMERON WEIFFENBACH, *Director*
Office of Enrollment and Discipline

Patents Available for License or Sale

4,172,886 CARBOHYDRATE CONVERSION TO CARBON MONOXIDE AND SYNTHETIC, Jonathan P. Soifer, Polster, Polster and Lucchesi, 763 South New Ballas Rd., St. Louis, Mo. 63141

4,702,704 TETRAHEDTAL CODON STEREO-TABLE, Leonard R. Svennsson, Birch Stewart, Kolasch & Birch, P.O. Box 747, Falls Church, Va. 22046

4,867,018 RETRACTABLE SLOTTED SCREWDRIVER BLADE, Samuel Spector, 14 BrookFall Rd., Edison, N.J. 08817

4,956,915 SANITARY NAIL CLIPPING DEVICE, Charles A. Anderson, 2402 108th N.E., Normen, Okla. 73071

4,971,480 GROUND HARDING MATERIAL INJECTOR, Wataru Nakanishi, Josefino P. Deleon, 3000 South Eads St., Arlington, Va. 22202

07/376,256 APPARATUS FOR EXERCISING LOWER LEG MUSCLES, Ronald W. Kock, 577 Abilene Trail, Wyoming, Ohio 45215

Des. 300,066 PORTABLE MAINCURE TRAY, Annie L. Spradley, 8303 Odessa Oaks, San Antonio, Tex. 78251

Des. 309,905 COVERED ICE CUBE TRAY Michael Weissman, 22 Louisburg Sq. Lakewood, N.Y. 08701

PATENT NOTICES

Certificates of Correction For Week of December 11, 1990

4,311,479	4,854,686	4,878,922	4,893,773
4,564,842	4,854,864	4,879,873	4,893,989
4,578,517	4,857,524	4,880,276	4,894,123
4,581,335	4,857,871	4,880,917	4,894,285
4,590,159	4,858,902	4,881,407	4,894,425
4,605,154	4,859,803	4,881,528	4,894,449
4,665,412	4,859,998	4,881,907	4,894,497
4,686,688	4,860,201	4,882,204	4,894,503
4,732,942	4,862,286	4,882,315	4,894,518
4,742,322	4,863,735	4,882,319	4,894,988
4,769,397	4,864,343	4,884,238	4,895,053
4,803,605	4,864,344	4,884,468	4,896,254
4,808,453	4,865,658	4,885,182	4,896,417
4,812,661	4,865,675	4,885,212	4,896,704
4,812,847	4,866,604	4,885,327	4,896,748
4,814,286	4,867,413	4,885,897	4,896,856
4,817,436	4,867,553	4,886,382	4,897,447
4,818,353	4,868,094	4,887,383	4,898,007
4,822,993	4,868,351	4,888,247	4,898,698
4,823,865	4,868,623	4,888,301	4,899,009
4,825,058	4,870,006	4,888,440	4,899,543
4,825,151	4,870,574	4,888,679	4,899,777
4,827,775	4,871,253	4,888,995	4,900,225
4,832,735	4,872,009	4,889,202	4,900,460
4,833,577	4,872,135	4,890,226	4,901,796
4,838,516	4,873,699	4,891,068	4,901,847
4,842,309	4,874,058	4,891,194	4,903,821
4,844,163	4,874,693	4,891,941	4,908,069
4,844,397	4,875,056	4,892,460	4,908,542
4,845,926	4,875,194	4,892,578	4,910,278
4,850,043	4,875,814	4,892,972	4,918,538
4,850,493	4,877,608	4,893,005	4,923,169
4,852,181	4,877,703	4,893,383	4,923,576
4,854,371	4,878,126	4,893,513	4,938,736
4,854,579	4,878,504	4,893,678	4,939,856

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	Columbus: Ohio State University Libraries	(614) 292-6175
	Toledo/Lucas County Public Library	(419) 259-5212
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	Pittsburgh, Carnegie Library of	(412) 622-3138
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PATENT EXAMINING CORPS

JAMES E. DENNY, Acting Assistant Commissioner
STEPHEN G. KUNIN, Acting Deputy Assistant Commissioner
CONDITION OF PATENT APPLICATIONS AS OF November 6, 1990

PATENT EXAMINING GROUPS	Actual Filing Date of Oldest New Case Awaiting Action
CHEMICAL EXAMINING GROUPS	
GENERAL METALLURGICAL, INORGANIC, PETROLEUM AND ELECTRICAL CHEMISTRY, AND ENGINEERING, GROUP 110—D. E. TALBERT, Director.	7-15-87
ORGANIC CHEMISTRY GROUP 120—JOHN F. TERAPANE, JR., Director.	11-21-88
SPECIALIZED CHEMICAL INDUSTRIES AND CHEMICAL ENGINEERING, GROUP— 130 BARRY S. RICHMAN, Director	2-27-89
HIGH POLYMER CHEMISTRY, PLASTICS, COATING, PHOTOGRAPHY, STOCK MATERIALS AND COMPOSITIONS, GROUP 150—J. O. THOMAS, Director	1-19-89
BIOTECHNOLOGY, GROUP 180—J. E. KITTLE, Director	6-18-87
ELECTRICAL EXAMINING GROUPS	
INDUSTRIAL ELECTRONICS, PHYSICS AND RELATED ELEMENTS, GROUP 210—D. G. Kelly, Director	10-15-87
SPECIAL LAWS ADMINISTRATION, GROUP 220—ROBERT E. GARRETT, Director.	11-2-88
INFORMATION PROCESSING, STORAGE, AND RETRIEVAL, GROUP 230—G. GOLDBERG, Director	4-1-88
PACKAGES, CLEANING, TEXTILES, AND GEOMETRICAL INSTRUMENTS, GROUP 240—TRYGVE M. BLIX, Director	3-30-89
ELECTRONIC AND OPTICAL SYSTEMS AND DEVICES, GROUP 250—EDWARD E. KUBASIEWICZ, Director.	2-22-89
COMMUNICATIONS, MEASURING, TESTING AND LAMP/DISCHARGE GROUP, GROUP— 260 STEWART LEVY, Acting Director	1-2-89
DESIGN, GROUP 290—ROBERT E. GARRETT, Director	3-6-87
MECHANICAL EXAMINING GROUPS	
HANDLING AND TRANSPORTING MEDIA, GROUP 310—B. R. GRAY, Director	7-3-89
MATERIAL SHAPING, ARTICLE MANUFACTURING AND TOOLS, GROUP 320—N. GODICI, Acting Director	4-6-89
MECHANICAL TECHNOLOGIES AND HUSBANDRY PERSONAL TREATMENT INFORMATION, GROUP 330—J. J. LOVE, Director	7-24-89
SOLAR, HEAT, POWER, AND FLUID ENGINEERING DEVICES, GROUP 340—C. CROYLE, Acting Director.	5-31-89
GENERAL CONSTRUCTIONS, PETROLEUM AND MINING ENGINEERING, GROUP 350— A. L. SMITH, Director	10-1-89

Expiration of patents: The patents within the range of numbers indicated below expire during November 1990 except those which may have had their terms curtailed by disclaimer under the provisions of 35 U.S.C. 253. Other patents, issued after the dates of the range of numbers indicated below, may have expired before the full term of 17 years for the same reasons, or have lapsed under the provisions of 35 U.S.C. 151.

Patents ..... Numbers 3,769,634 to 3,775,773 inclusive
Plant Patents ..... 3,404 to 3,412 inclusive

REEXAMINATIONS

DECEMBER 11, 1990

Matter enclosed in heavy brackets [ ] appears in the patent but forms no part of this reexamination specification; matter printed in italics indicates additions made by reexamination.

B1 4,864,390 (1393rd)

DISPLAY SYSTEM WITH EQUAL PATH LENGTHS

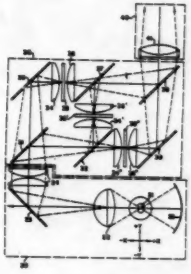
Thomas S. McKechnie, Ossining; Jill F. Goldenberg, Pelham Manor; Joshua D. Eskin, New York; Jeffrey A. Shimizu, Mt. Kisco, all of N.Y.; Ralph H. Bradley, Jr., and William F. Guerinot, both of Knoxville, Tenn., assignors to North American Philips Corporation

Reexamination Request No. 90/001,982, Apr. 4, 1990.

Reexamination Certificate for Patent No. 4,864,390, issued Sep. 5, 1989, Ser. No. 292,618, Dec. 29, 1988.

Int. Cl.[5] H04N *9/30, 9/31*

U.S. Cl. 358—60



AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claims **1–25, 31–37, 39–72** and **76–82** is confirmed.

Claims **27, 38** and **74** are cancelled.

Claims **26** and **73** are determined to be patentable as amended.

Claims **28–30** and **75**, dependent on an amended claim, are determined to be patentable.

1. A display system comprising an illumination subsystem providing a single illuminating beam, a modulation subsystem, and a projection subsystem, wherein said modulation subsystem includes at least two transmission light valves, each of said transmission light valves directly passing at least a portion of said single illuminating beam to said projection subsystem, each of said transmission light valves being disposed at a first path length from said illumination subsystem, said first path length being equal for all transmission light valves, and each of said transmission light valves being disposed at a second path length from said projection subsystem said second path length being equal for all transmission light valves.

REISSUES

DECEMBER 11, 1990

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates additions made by reissue.

Re. 33,478

PYRIDYL(OXY/THIO)PHENOXY COMPOUNDS HERBICIDAL COMPOSITIONS AND METHODS

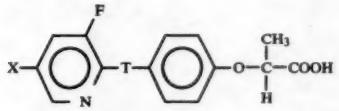
Howard Johnston, Walnut Creek, and Lillian H. Troxell, Antioch, both of Calif., assignors to The Dow Chemical Company, Midland, Mich.

Original No. 4,565,568, dated Jan. 21, 1986, Ser. No. 497,295, May 23, 1983. Continuation-in-part of Ser. No. 389,840, Jun. 18, 1982, abandoned. Application for reissue Oct. 31, 1988, Ser. No. 267,490

Int. Cl.[5] **C07D** *213/64, 213/63;* **A01N** *43/40*

U.S. Cl. 71—94 **6 Claims**

1. A compound having herbicidal activity and having the formula



wherein X is CF_3, CF_2[,] *or* $CClF_2$[, Br or Cl] and T is O or S, or a resolted "R" enantiomer thereof, and the agriculturally acceptable salts, esters, and mono- or disubstituted or unsubstituted lower alkyl and phenyl amides thereof, wherein the substituents are selected from lower alkyl, lower alkkoxy, halo, cyano, nitro, hydroxy, amino or carboxyl.

Re. 33,479

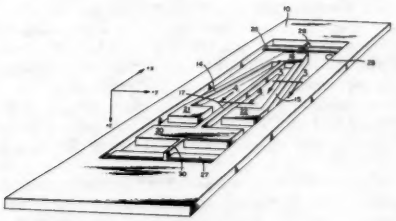
VIBRATORY ANGULAR RATE SENSING SYSTEM

William F. Juptner, Laguna Beach; David F. Macy, Mission Viejo, and Juergen H. Staudte, Anaheim, all of Calif., assignors to Piezoelectric Technology Investors, Laguna Hills, Calif.

Original No. 4,538,461, dated Sep. 3, 1985, Ser. No. 572,782, Jan. 23, 1984. Continuation of Ser. No. 859,474, May 2, 1986, abandoned. Application for reissue Jan. 22, 1988, Ser. No. 147,621

Int. Cl.[5] **G01P** *9/04*

U.S. Cl. 73—505 **21 Claims**



1. A vibratory angular rate sensing system comprising:

(a) a wafer of crystalline quartz having piezoelectric properties and forming a [substantially rectangular] mounting [frame and having a substantially rectangular central opening];

(b) a *form having a* pair of tines extending at a predetermined acute angle [within said opening] *from an origin and having an axis of symmetry;*

(c) *and* a base interconnecting said tines near their origin;

(d) [a first and a second suspension bridge, each being secured at its ends to] *bridge means supporting said fork on* said mounting [frame];

(e) a [pivot] *torsion member* extending [between] *along* the axis of symmetry of said [tines] *fork* and through said base[, said pivot] *and* being secured [near both ends by said suspension bridges] *to said bridge means for forming bridges;*

(f) a reaction mass secured to said [pivot at its end extending beyond the wide opening of said tines] *torsion member;*

(g) a pair of masses, each being secured to the free end of one of said tines, said tines having large fundamental and small harmonic thrust components, [and] said pair of masses being each disposed with the center of mass offset from the axis of the associated tine[,] whereby the centers of each mass move in arcs having substantially no thrust component;

(h) means [including a first pair of electrodes secured to said tines] for driving said *form to cause said* tines *to vibrate* substantially at their resonant frequency [determined by said pair of masses, said tines and said base]; and

(i) [a second pair of electrodes secured] *means coupled* to said [pivot] *torsion member* for picking up an output signal representative of torsion which produces a shear strain resulting in an amplitude variation of [the] *an* electric field.

Re. 33,480

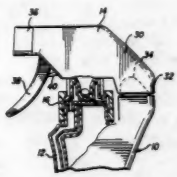
PUMP AND CONTAINER ASSEMBLY

Theodore Guss, Crystal Lake, and Sing Fu, Wheeling, both of Ill., assignors to Continental Can Company, Inc., Norwalk, Conn.

Original No. 4,863,071, dated Sep. 5, 1989, Ser. No. 221,217, Jul. 19, 1988. Application for reissue Nov. 7, 1989, Ser. No. 432,887

Int. Cl.[5] **B67D** *5/40*

U.S. Cl. 222—207 **15 Claims**



1. A pump connection for use with a container having a neck finish including a dual passage mouth of the type including an integral dispensing tube and a sealable end surface, said pump connection comprising a gasket separately sealable relative to each passage of a dual passage container mouth, a seal member overlying said gasket and providing spaced and separate fluid and vent passages opening from said gasket, a pump housing carrying a [resiliently deformable] pump element in sealed relation with said fluid passage, and a hold down member engageable with a container neck finish for clamping said pump housing *and seal member* against said [seal member] *gasket.*

Re. 33,481

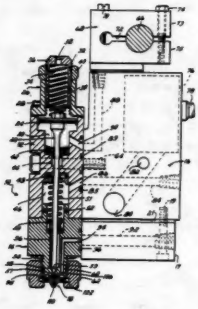
ADHESIVE SPRAY GUN AND NOZZLE ATTACHMENT

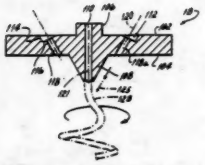
Roger A. Ziecker, Lawrenceville; Bentley J. Boger, Atlanta, and Dwayne N. Lewis, Smyrna, all of Ga., assignors to Nordson Corporation, Amherst, Ohio

Original No. 4,785,996, dated Nov. 22, 1988, Ser. No. 41,712, Apr. 23, 1987. Application for reissue Apr. 28, 1989, Ser. No. 345,467

Int. Cl.[5] B05B *1/34*

U.S. Cl. 239—298 12 Claims





9. A nozzle attachment for use in an apparatus for spraying hot melt adhesive which includes a gun body having a nozzle formed with an adhesive passageway for conveying heated hot melt adhesive and an air delivery passageway for conveying pressurized air, said nozzle attachment comprising:

a one piece annular plate formed with a first surface on one side of said plate, and a second surface on an opposite side of said plate having a nozzle tip extending outwardly therefrom;

said plate being formed with a throughbore extending from said first surface through said nozzle tip, said throughbore having an axis, means mounting said plate to said gun of said gun body so that said throughbore communicates with said adhesive passageway in said nozzle for receiving heated hot melt adhesive, the hot melt adhesive being ejected from said nozzle tip in said annular plate to form an adhesive bead;

said plate being formed with an annular surface, said annular surface sloping relative to the axis of said throughbore;

said plate being formed with a plurality of bores extending from said annular surface through said plate, said bores being in communication with said air delivery passageway;

each of said bores having a longitudinal axis extending substantially perpendicular to said annular surface, said bores being formed at an angle with respect to said throughbore in said plate to direct pressurized air flowing therethrough substantially tangent to the outer periphery of said adhesive bead ejected from said nozzle tip to form said adhesive bead into elongated adhesive fibers and to impart a twisting motion to said elongated adhesive fibers to form a spiral spray pattern of elongated adhesive fibers for deposition on a substrate.

Re. 33,482

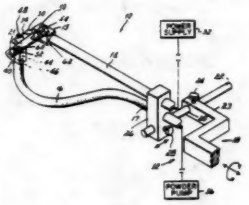
ADJUSTABLE POWDER SPRAY GUN

Douglas C. Mulder, Wellington, Ohio, and David E. O'Ryan, Jackson, Mich., assignors to Nordson Corporation, Amherst, Ohio

Original No. 4,613,083, dated Sep. 23, 1986, Ser. No. 622,978, Jun. 21, 1984. Application for reissue Sep. 8, 1988, Ser. No. 242,057

Int. Cl.[5] B05B *5/02*

U.S. Cl. 239—707 6 Claims



1. Apparatus for applying a solid particulate powder coating to the interior surface of a target object, comprising:

a mounting block;

a hollow, rigid support member having a longitudinal axis, one end of said support member being mounted to said mounting block, the other, outer end of said support member mounting a powder charging electrode;

a high voltage cable carried [with] *within* said hollow support member for connecting said powder charging electrode to a source of electrical power;

a nozzle including a flow passage having an inlet port at one end and a discharge orifice at the other end, said inlet port receiving solid particulate powder and said discharge orifice ejecting the solid particulate powder in a predetermined pattern from said flow passage;

an adjustment element connected between said nozzle and said outer end of said support member for positioning said discharge orifice of said nozzle proximate said powder charging electrode to electrostatically charge solid particulate powder ejected from said discharge orifice;

means connected to said adjustment element for adjusting the [angle] *direction* of said nozzle flow passage in said nozzle relative to said longitudinal axis of said support member;

a flexible tube for transmitting solid particulate powder, said flexible tube having an upstream portion fixedly connected to said [support member] *mounting block* and a discharge end fixedly connected to said inlet port of said nozzle flow passage;

said flexible tube being disposed in a plane oriented generally perpendicularly to said discharge orifice so as to direct the solid particulate powder [substantially vertically upwardly] through said nozzle flow passage;

said flexible tube being smoothly curved between said discharge end and said upstream portion so as to prevent powder from becoming entrapped in sharply angled corners of a powder flow path between said upstream portion of said flexible tube and said discharge orifice of said nozzle.

Re. 33,483

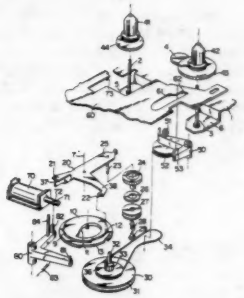
TAPE RECORDER

Masao Kamijo, Tokyo, Japan, assignor to Tokyo Pigeon Co., Ltd., Tokyo and Kabushiki Kaisha Sankyo Seiki Seisakusho, Nagano, both of, Japan

Original No. 4,720,755, dated Jan. 19, 1988, Ser. No. 803,459, Dec. 2, 1985. Application for reissue Apr. 28, 1989, Ser. No. 345,463

Int. Cl.[5] G11B *15/00, 17/00*

U.S. Cl. 360—96.3 **28 Claims**



15. A tape player having a plurality of operational modes, including a stop mode, a reproduction mode, a fast-forwarding mode, and a rewinding mode, said tape player comprising:

a rotatably driven driving gear;

a head plate supported for movement in an advance direction from a stop position to a reproduction position, said head plate being movable to a fast-forwarding/rewinding position located between said stop and reproduction positions;

a trigger member supported for movement between first and second positions;

a rotatably supported assist gear having a toothed portion which can engage said driving gear so that said driving gear rotates said assist gear in a direction of rotation and having a non-toothed portion which interrupts engagement of said driving gear and said assist gear when angularly aligned with said driving gear, said assist gear including first, second and third control portions, wherein when said assist gear is respectively in first, second and third angular positions which are angularly spaced, movement of said trigger member effects movement of a portion thereof between positions engaging and spaced from said first, second and third control portions, respectively, said driving gear being angularly aligned with said non-toothed portion of said assist gear when said assist gear is in each of said first, second and third angular positions, engagement of said portion of said trigger member with said first, second and third control portions of said assist gear respectively preventing rotational movement of said assist gear past its first, second and third angular positions, respectively.

first means responsive to rotation of said assist gear for positioning said head plate in said stop position, said reproduction position and said fast-forwarding/rewinding position when said assist gear is respectively in said first, said second and said third angular positions;

second means for effecting rotation of said assist gear in said direction of rotation away from said first, second and third angular positions thereof following interruption of the engagement of said portion of said trigger member with said first, second and third control portions, respectively; and

a single operating mode changing solenoid which is operatively coupled to said trigger member and can be selectively energized and de-energized in order to effect movement of said trigger member between said two positions thereof, said solenoid controlling movement of said trigger member so that said portion of said trigger member moves out of engagement with said first control portion and then into engagement with said second control portion following rotation of said assist gear to effect a change from the stop mode to the reproduction mode, moves out of engagement with said first control portion and then into engagement with said third control portion following rotation of said assist gear to effect a change from the stop mode to the fast-forwarding mode, moves out of engagement with said first control portion and then into engagement with said third control portion following rotation of said assist gear to effect a change from the stop mode to the rewinding mode, moves out of engagement with said second control portion and then into engagement with said third control portion following rotation of said assist gear to effect a change from the reproduction mode to the fast-forwarding mode, moves out of engagement with said second control portion and then into engagement with said first control portion following rotation of said assist gear to effect a change from the reproduction mode to the stop mode, and moves out of engagement with said third control portion and then into engagement with said first control portion following rotation of said assist gear to effect a change from one of the fast-forwarding mode and the rewinding mode to the stop mode.

22. A tape player having a plurality of operational modes, including a stop mode, a reproduction mode, and a high speed mode, said tape player comprising:

a trigger member supported for movement between first and second positions;

a rotatably supported assist member rotatable in a direction of rotation and having first, second and third control portions, wherein when said assist member is respectively in first, second and third angular positions which are angularly spaced, movement of said trigger member effects movement of a portion thereof between positions engaging and spaced from said first, second and third control portions, respectively, engagement of said portion of said trigger member with said first, second and third control portions of said assist member respectively preventing rotational movement of said assist member past its first, second and third angular positions, respectively;

means for effecting rotation of said assist member in said direction of rotation away from said first, second and third angular positions thereof following interruption of the engagement of said portion of said trigger member with said first, second and third control portions, respectively;

means responsive to said assist member being in said first, second and third angular positions for respectively implementing said stop mode, reproduction mode and high speed mode, including means for maintaining a tape motionless in said stop mode, for effecting lengthwise movement thereof at a first speed in said reproduction mode, and for effecting lengthwise movement thereof at a second speed substantially greater than said first speed in said high speed mode; and

a single operating mode changing solenoid which is operatively coupled to said trigger member and can be selectively energized and de-energized in order to effect movement of said trigger member between said two positions thereof, said solenoid controlling movement of said trigger member so that said portion of said trigger member moves out of engagement with a respective one of said first, second and third control portions and then into engagement with another of said control portions following rotation of said assist member to effect a change respectively from said stop mode, said reproduction mode and said high speed mode to a different said mode.

Re. 33,484

CLEANING DEVICE FOR A MONOCHROMATIC COPYING MACHINE

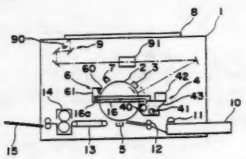
Yoshiaki Imanaka, Nara, Japan, assignor to Sharp Kabushiki Kaisha, Osaka, Japan

Original No. 4,696,565, dated Sep. 29, 1987, Ser. No. 881,788, Jul. 3, 1986. Application for reissue Feb. 15, 1989, Ser. No. 311,285

Claims priority, application Japan, Jul. 5, 1985, 60-148792

Int. Cl.[5] G03G *15/08*

U.S. Cl. 355—298 **4 Claims**



2. An image forming device comprising:

means for accommodating selectively a plurality of developer units adapted to be operated one at a time therein, a selected one of said developer units being interchangeable with another one of said developer units; and

toner recovery means for removing residue toner therefrom and conveying said residue toner towards a selected said developer unit operated therein;

each of said developer units comprising a toner reservoir for accommodating a mass of toner for developing images in said image forming device, and a residue toner collecting chamber for communicating with and receiving residue toner from said toner recovery means.

Re. 33,485

LIGHTED GUN SIGHTS

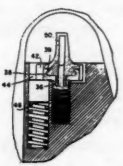
Itzchak Frimer, Bnai Brak, Israel, assignor to Scopus Optical Industry, Hof HaCarmel, Israel

Original No. 4,574,335, dated Mar. 4, 1986, Ser. No. 650,552, Sep. 12, 1984. Continuation of Ser. No. 316,053, Oct. 28, 1981, abandoned. Application for reissue Feb. 17, 1988, Ser. No. 156,862

Claims priority, application Israel, Oct. 31, 1980, 61388

Int. Cl.[5] F41G *1/34*

U.S. Cl. 362—84 **8 Claims**



1. Apparatus for assisting aiming of firearms in darkness comprising:

[a sight defining two spaced upstanding elements, each bearing at identical levels thereon one of a pair of light sources defining dots;]

a [forward] pointer having a longitudinal axis, said pointer comprising a base portion whose height is determined by rotatable threading thereof into a socket fixed on the firearm, and a top portion which is rotatably mounted with respect to said base portion and arranged for rotation about a rotation axis defined by the longitudinal axis of said [forward] pointer without changing the height thereof; and a [third] light source defining a dot associated with the top portion of said [forward] pointer of said firearm, [said third light source arranged to be aligned along a line between said pair of light sources and aligned with a target when the firearm is aimed in darkness,] whereby said [third] light source may be maintained in a rearward facing direction with respect to the firearm at any height [thereof] *of the light source.*

Re. 33,486

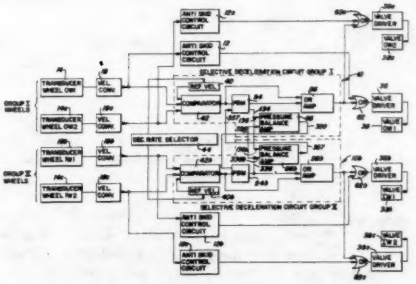
SELECTIVE DECELERATION BRAKE CONTROL SYSTEM

Edgar A. Hirzel, Granada Hills, and Robert D. Cook, Valencia, both of Calif., assignors to Hydro-Aire Div. of Crane Company, Burbank, Calif.

Original No. 4,022,513, dated May 10, 1977, Ser. No. 243,251, Apr. 12, 1972. Continuation of Ser. No. 488,525, Apr. 28, 1983, abandoned, which is a continuation of Ser. No. 119,381, Feb. 7, 1980, abandoned. Application for reissue Mar. 5, 1987, Ser. No. 22,488

Int. Cl.[5] B60T *8/02*

U.S. Cl. 364—426.02 **44 Claims**



13. A brake control system, for an aircraft having [plural groups of braked load-bearing wheels for applying and controlling a brake application means for said wheels independently of operator brake application, said system] *separate inboard and outboard wheel groups in which the wheels in each group are symmetrically mounted on opposite sides of the aircraft,* comprising:

brake application means for providing brake pressure to each wheel;

anti-skid control means for providing an anti-skid brake control signal;

signal generating means associated with each of said wheels for producing a first signal that is [related] *proportional* to the rotational speed of its associated wheel;

reference generating means for generating a *velocity* reference signal *having a selectively variable rate of decrease;*

rate selector means for manually [selecting said] *modifying said reference generating means for producing a* reference signal indicative of [a] *the* desired [rate of] vehicle deceleration;

separate averaging means [in] *for* each of said wheel groups responsive to the first signal associated with each of said wheels in said group [to form an average] *for continuously determining the average speed of said wheels in each said group and for forming an analog* signal [therefrom] *which is a function of said average speed of said wheels;*

comparison means for each of said wheel groups for comparing said [average] *analog* signals for the associated wheel group with said reference signal for generating an error signal indicative of the difference between said [average] *analog* signal for the associated wheel group and said reference signal;

modulating means for each of said wheel groups responsive to said error signal for producing a modulating brake signal when said error signal exceeds a predetermined threshold level, said modulating brake signal including a time integral

function of both positive and negative variations of said error signal from said threshold level;

control means associated with each group of wheels *and responsive to said modulating brake signal* for providing a *deceleration brake control* signal to said brake application means [to apply brake pressure to said wheels] independently of operator brake application and [responsive to said error signal to provide a deceleration control signal] for controlling said brake pressure in order to maintain said desired rate of deceleration, *said control means including pressure balancing means associated with each of said modulating means for comparing the modulating brake signal of said associated modulating means with the modulating brake signal of another modulating means and causing the other modulating means to produce a modulating brake signal whose valve is not less than that of the associated modulating brake signal, thereby equalizing brake load distribution between said wheel groups;* [and]

means for preventing said brake application means from applying said brake pressure in response to said deceleration brake control signal for said group of wheels and for applying brake pressure in response to said anti-skid brake control signal when said anti-skid brake control signal commands a lower brake pressure than does said deceleration brake control signal;

means for submitting an on-ramp signal to said modulating means to cause said modulating means to provide an initial deceleration brake control signal to gradually increase brake pressure; and

means for submitting an off-ramp signal to said modulating means to cause said modulating means to provide a final deceleration brake control signal to gradually remove brake pressure.

Re. 33,487

WATER TREATMENT AND SOIL TESTING

Colin E. Marks, Ryton, England, assignor to Palintest Limited, Gateshead, England

Original No. 4,775,513, dated Oct. 4, 1988, Ser. No. 421,964, Mar. 5, 1987. Application for reissue Sep. 8, 1989, Ser. No. 404,853

Claims priority, application United Kingdom, Mar. 12, 1986, 8606073

Int. Cl.[5] G01N *33/24*

U.S. Cl. 422—61 **11 Claims**

1. A soil testing kit comprising, in combination:

(a) a water-tight container formed of a flexible synthetic, collapsible plastic material which collapses on its own accord to a substantially flat configuration when empty;

(b) said container having a liquid spout disposed at one end thereof, strainer means disposed within said spout, and a closure cap for said spout;

(c) said container having a predetermined interior capacity and within said container and mixed together, an anion-exchange resin and a cation-exchange resin having a predetermined total combined volume that occupies a minor proportion of the interior capacity of said container;

(d) a first predetermined amount of soil extraction chemicals [in said container], and

(e) a second predetermined amount of soil analysis reagents [in said container].

Re. 33,488

MARINE VESSEL WITH INTERNAL COMBUSTION ENGINE HAVING AN EXHAUST PIPE

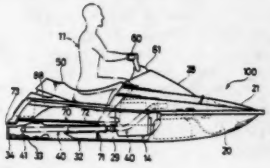
Noboru Kobayashi, Kosai, Japan, assignor to Yamaha Hatsudoki Kabushiki Kaisha, Iwata, Japan

Original No. 4,824,409, dated Apr. 25, 1989, Ser. No. 178,836, Mar. 23, 1988. Continuation of Ser. No. 934,229, Nov. 21, 1986, abandoned. Application for reissue Oct. 11, 1989, Ser. No. 419,937

Claims priority, application Japan, Nov. 26, 1985, 60-265889

Int. Cl.[5] B63H *11/02*

U.S. Cl. 440—47 **2 Claims**



1. A boat operated by an internal combustion engine comprising a boat body having a bow and a stern, said engine being mounted on said boat body, inlet means in said boat body for receiving water from outside the boat body, a flow passage means extending from said inlet means to the stern of the boat, said flow passage means having an outlet nozzle disposed at the stern of the boat through which the water exits from the flow passage means, a propeller disposed within said flow passage means, a hollow enclosure means mounted on said boat body and enclosing therein substantially the entire flow passage means, said hollow enclosure means having two generally upright side [walls extending fore and aft] *wall means* and a top wall connected to said *two* upright side [walls] *wall means* such that said hollow enclosure means has a substantially inverted U-shaped cross-sectional configuration, said hollow enclosure means also having an opening at one end thereof located at the stern of the boat, said hollow enclosure means further having a forward transverse wall, a propeller drive shaft extending between said engine and said propeller, a propeller shaft enclosure means disposed about said shaft, said propeller shaft enclosure means being connected to said flow passage means and extending forward of said inlet means, said propeller shaft enclosure means extending through said forward transverse wall of said hollow enclosure means, said engine having an exhaust conduit connected to one of said *two* side [walls] *walls means* of said hollow enclosure means such that exhaust gases from the engine pass into said hollow enclosure means and exit the latter through said opening in said hollow enclosure means, said flow passage means being spaced from said *two* upright side [walls] *wall means* and also being spaced from said top wall, said flow passage means being thereby disposed within said hollow enclosure means such that under operating conditions of the boat, a pressure less than atmospheric pressure is provided within the hollow enclosure means to facilitate the exhaust of the engine exhaust gases from said exhaust conduit into said hollow enclosure means.

Re. 33,489

PHOTOLYTICALLY CLEAVABLE, N-ACYLATED STERICALLY HINDERED AMINES

Godwin Berner, Binningen, and Mario Slongo, Tafers, both of Switzerland, assignors to Ciba-Geigy Corporation, Ardsley, N.Y.

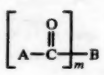
Original No. 4,785,102, dated Nov. 15, 1988, Ser. No. 899,133, Aug. 21, 1986. Application for reissue Sep. 25, 1989, Ser. No. 411,962

Claims priority, application Switzerland, Aug. 27, 1985, 3668/85

Int. Cl.[5] C07D 471/10

U.S. Cl. 546—20 5 Claims

1. A compound of formula I



wherein

m is 1, 2 or 3,

A is a R^1—CO— or R^2—CH_2— group, wherein

R^1 is phenyl or phenyl which is substituted by halogen, C_1–C_{12}alkyl, C_1–C_4alkoxy or hydroxy, or is naphthyl[, C_1–C_{12}alkoxy, cyclohexyloxy, phenoxy or benzyloxy] and, if m=1, may also be a radical B,

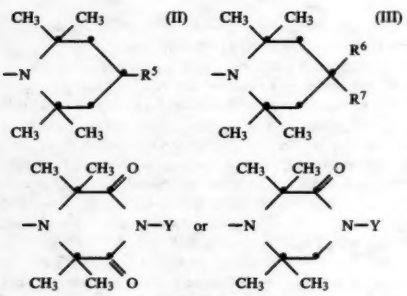
R^2 is —CN, —P(O)$(OR^3)_2$, CH_3CO— or OR^4, wherein

R^3 is C_1–C_4alkyl or phenyl, and

R^4 is phenyl or phenyl which is substituted by halogen or C_1–C_4alkyl, and

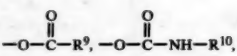
when m is 1,

B is a radical corresponding to the formulae



wherein

R^5 is hydrogen, —OR^8,



—$N(R^{10}R^{11})$,

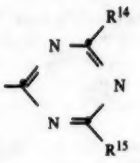
R^6 is —OH or —OR^{12} and R^7 is —OR^{12}, —CN, —$COOR^{13}$ or —$CONH_2$, or R^6 and R^7 together are the oxo radical (=O), or R^6 and R^7, together with the C-atom to which they are attached, form an unsubstituted 2-spiro-1,3-dioxolane, 2-spiro-1,3-dioxane, 5-spiro-1,3-oxazolidine, 2-spiro-1,3-oxazolidine or 5-spiro-1,3-imidazolidine ring or said ring substituted by one or more identical or different members selected from C_1–C_{12}alkyl or the oxo radical,

R^8 is C_1–C_{12}alkyl, benzyl, allyl or 2-cyanoethyl,

R^9 is C_1–C_{18}alkyl, C_2–C_{12}alkenyl, C_5–C_8cycloalkyl, phenyl or phenyl which is substituted by halogen, C_1–C_{12}alkyl, C_1–C_4alkoxy or hydroxyl, or is C_7–C_{12}phenylalkyl, C_1–C_4alkoxy or phenoxy,

R^{10} is C_1–C_{12}alkyl, cyclohexyl, phenyl, naphthyl, or phenyl which is substituted by C_1–C_4alkyl,

R^{11} is C_2–C_{12}alkanoyl, C_3–C_8alkenoyl, benzoyl or a group of the formula



wherein

R^{14} and R^{15} are each independently of the other C_1–C_8alkoxy, phenoxy, or a group —$N(R^{10})(R^{16})$, in which R^{16} is hydrogen or C_1–C_{12}alkyl,

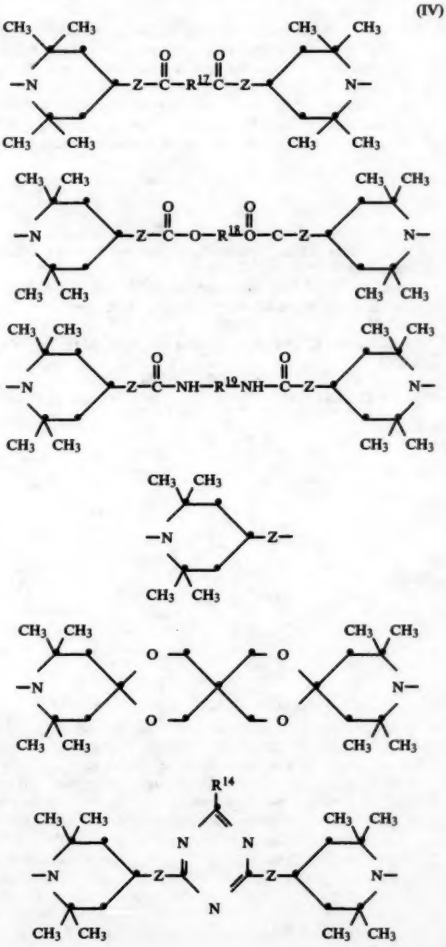
R^{12} is C_1–C_{12}alkyl and R^{13} is C_1–C_4alkyl, and

Y is hydrogen, C_1–C_{12}alkyl, allyl or benzyl;

when m is 2,

B is a divalent radical corresponding to the formulae

(IV)



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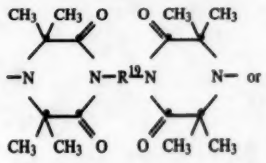
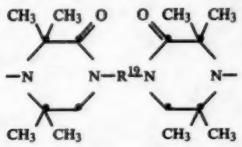




wherein

Z is —O—, —NH— or —NR[10]—,

R[17] is methylene, 1,2-ethylene, C_3–C_{20}polymethylene, or branched C_3–C_{20}alkylene, C_2–C_{10}alkenylene, 1,4-cyclohexylene, 1,3-cyclohexylene, cyclohexane-1,4-dimethylene, 1,3- or 1,4-phenylene, 1,4- or 1,5-naphthylene, 4,4'-diphenylene, diphenylmethane-4,4'-diyl, diphenyl oxide-4,4'-diyl or m- or p-xylene, or a radical —NR—R[19]—NH—,

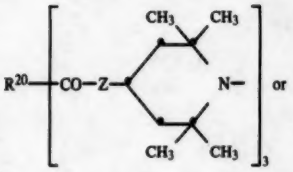
R[18] is 1,2-ethylene, 1,2-propylene, 1,3-propylene, 1,2-butylene, 1,4-butylene, hexamethylene, 1,4-cyclohexylene or cyclohexane-1,4-dimethylene,

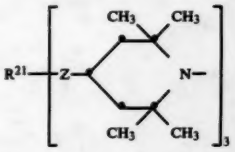
R[19] is 1,2-ethylene, trimethylene, tetramethylene, hexamethylene, oxtamethylene, dodecamethylene, 2,2-dimethyltrimethylene, trimethyloctamethylene, 1,4-cyclohexylene, cyclohexane-1,4-dimethylene, 1,3-phenylene, 4,4'-diphenylene, diphenylmethane-4,4'-diyl, diphenyl oxide-4,4'-diyl, or m- or p-xylylene, and

R[10] and R[14] are as defined above;

and, when m is 3,

B is a trivalent radical corresponding to the formulae

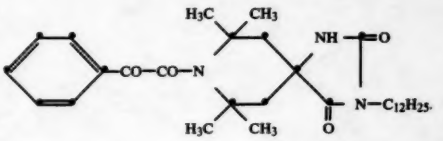




wherein

R[20] is propane-1,2,3-triyl, butane-1,2,4-triyl, benzene-1,3,5-triyl, benzene-1,2,4-triyl or naphthalene-1,4,5-triyl, R[21] is a 1,3,5-triazin-2,4-triyl radical and Z is as defined above.

5. A compound according to claim 4 of the formula



PLANT PATENTS

GRANTED DECEMBER 11, 1990

Illustrations for plant patents are usually in color and therefore it is not practicable to reproduce the drawing.

7,390
ROSE PLANT—MEIROLOUR VARIETY

Alain A. Meilland, Antibes, France, assignor to The Conard-Pyle Company, West Grove, Pa.

Filed May 19, 1989, Ser. No. 354,284
Claims priority, application France, Oct. 17, 1988, 8037
Int. Cl.[5] A01H *5/00*

U.S. Cl. Plt.—20 **1 Claim**

1. A new and distinct variety of Hybrid Tea rose plant characterized by the following combination of characteristics:

(a) forms in abundance attractive long lasting fully double blossoms which are currant red on the upper surface and light cardinal red on the lower surface,
(b) exhibits an erect growth habit,
(c) forms vigorous vegetation,
(d) is well adapted to greenhouse forcing for cut flower production, and
(e) exhibits good resistance to cryptogamic diseases;
substantially as herein shown and described.

7,391
GERANIUM PLANT NAMED FISMANON

Ingeborg Schumann, Hoehr-Grenzhausen, Fed. Rep. of Germany, assignor to Florfis AG, Binningen, Switzerland

Filed Oct. 25, 1989, Ser. No. 426,193
Int. Cl.[5] A01H *5/00*

U.S. Cl. Plt.—68 **1 Claim**

1. A new and distinct cultivar of Geranium plant named Fismanon, as illustrated and described.

7,392
GERANIUM PLANT NAMED FISBAL

Ingeborg Schumann, Hoehr-Grenzhausen, Fed. Rep. of Germany, assignor to Florfis AG, Binningen, Switzerland

Filed Oct. 25, 1989, Ser. No. 426,174
Int. Cl.[5] A01H *5/00*

U.S. Cl. Plt.—68 **1 Claim**

1. A new and distinct cultivar of Geranium plant named Fisbal, as illustrated and described.

7,393
GERANIUM PLANT NAMED FISCAB

Ingeborg Schumann, Hoehr-Grenzhausen, Fed. Rep. of Germany, assignor to Florfis AG, Binningen, Switzerland

Filed Oct. 25, 1989, Ser. No. 426,154
Int. Cl.[5] A01H *5/00*

U.S. Cl. Plt.—68 **1 Claim**

1. A new and distinct cultivar of Geranium plant named Fiscab, as illustrated and described.

7,394
GERANIUM PLANT NAMED FISGLO

Ingeborg Schumann, Hoehr-Grenzhausen, Fed. Rep. of Germany, assignor to Florfis AG, Binningen, Switzerland

Filed Oct. 25, 1989, Ser. No. 426,175
Int. Cl.[5] A01H *5/00*

U.S. Cl. Plt.—68 **1 Claim**

1. A new and distinct cultivar of Geranium plant named Fisglo, as illustrated and described.

7,395
CHRYSANTHEMUM PLANT NAMED YELLOW FRESCO

George A. Bailey, Great Yarmouth, and Kieth G. Lintott, Chichester, both of England, assignors to Framptons Nurseries Ltd., West Sussex, England

Filed Mar. 4, 1988, Ser. No. 164,462
Int. Cl.[5] A01H *5/00*

U.S. Cl. Plt.—78 **1 Claim**

1. A new and distinct variety of *Chrysanthemum morifolium* bailey of the yellow spray type substantially as herein shown and described characterized particularly as to novelty by a long flowering season, fast response, moderate growth, resistance to petal damping, and non-susceptibility to tip scorch/loss.

PATENTS

GRANTED DEC. 11, 1990

ERRATA

For CLASS	See PATENT NO.
452-198	4,976,009
452-116	4,976,010
452-110	4,976,011
087-059	4,976,173
606-064	4,976,258
194-200	4,976,346
192-020	4,976,347
192-006	4,976,348
244-207	4,976,349
222-324	4,976,372
280-641	4,976,406
248-118	4,976,407
248-446	4,976,408
248-469	4,976,409
248-514	4,976,410
248-524	4,976,411
248-634	4,976,412
236-011	4,976,459
236-012	4,976,460
236-013	4,976,461
236-034	4,976,462
237-008	4,976,463
237-081	4,976,464
239-224	4,976,465
239-265	4,976,466
239-381	4,976,467
239-587	4,976,468
241-024	4,976,469
241-037	4,976,470
241-073	4,976,471
241-172	4,976,472
242-067	4,976,473
242-107	4,976,474
242-115	4,976,475
433-118	4,976,625
313-276	4,976,643
505-001	4,977,109

250-208 4,977,304
392-380 4,977,306
338-021 4,977,357
355-027 4,977,437
369-044 4,977,539

PATENTS

GRANTED DECEMBER 11, 1990

GENERAL AND MECHANICAL

4,975,980
PROTECTIVE HELMET FOR FIREFIGHTERS
Stephen R. Ersteniuk, 2395 Titus Ave., Rochester, N.Y. 14622
Filed May 19, 1989, Ser. No. 353,962
Int. Cl.[5] A42B *3/00*
U.S. Cl. 2—6 **18 Claims**

1. A fire helmet comprised of a helmet shell adapted to receive the head of a wearer and fit over the crown of the head of the wearer, a radially, inwardly-spaced liner attached to the inside of said helmet shell, a headband attached to said liner, fire-resistant ear flaps secured to said liner, and a fire-resistant hood permanently secured to said headband, wherein:

(a) said hood consists essentially of a textile material consisting of fiber selected from the group consisting of man-made fiber, natural fiber, and mixtures thereof;

(b) said headband consists of flame-retardant fabric;

(c) said ear flaps are attached to said liner so that they extend downwardly therefrom sufficiently below the head portion of said helmet to cover the ears and at least a portion of the neck of said wearer;

(d) said hood is comprised of a fire-resistant head portion adapted to cover the crown, forehead, and the ears of the wearer, a fire resistant lower marginal portion extending sufficiently below said head portion to cover the lower neck of the wearer, and at least two fire resistant flaps permanently attached to said head portion and said lower margin portion at one end of said flaps, wherein said flaps extend sufficiently below said head portion to cover the chin and the neck of the firefighter; and

(e) each of said two fire resistant flaps of said hood contains non-metallic and fire-resistant means for adjustably and releasably fastening a portion of one of said flaps to a portion of another of said flaps.

4,975,981
SLIP-ON FACE SHIELD
Michael A. Ray, Louisville, Ky., assignor to Borden, Inc., Columbus, Ohio
Filed Aug. 21, 1989, Ser. No. 396,310
Int. Cl.[5] A42B *1/06*
U.S. Cl. 2—10 **5 Claims**

1. A head and face shield comprising,

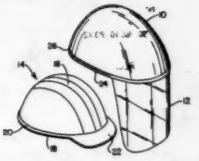
a curved shield configured to extend (1) vertically from about the forehead of a wearer to below the wearer's chin and (2) horizontally in a curve around the wearer's face from about the forward edge of one ear to the other ear, said shield being impervious to liquids, whereby an object traveling in a straight line toward the face of the wearer must penetrate the shield before it strikes the face,

means for holding the shield out of contact with the wearer's face,

a cap for covering the top of the wearer's head above the wearer's ears, said cap comprising a flexible and fluid impervious material which is generally configured in the shape of a dome which is open at the bottom edge,

a portion of the bottom edge of said cap being connected to the upper portion of said shield, said connection being fluid impervious whereby fluid draining from the exterior of the dome of the cap onto the shield will pass from the dome to the exterior surface of the shield,

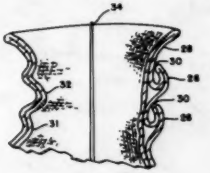
a portion of the bottom edge of the cap being elastomeric to allow flexibility of the cap during donning and removal of the shield and to flexibly hold the shield in place when it is on the wearer's head,



the means for holding the shield out of contact with the wearer's face comprises a substantially rigid hat suitable for resting on the head of a wearer,

said hat having a generally upwardly extending dome-shape with a lower edge, the bottom edge of the cap extending below the lower edge of the hat completely about its periphery to allow the elastomeric portion of the cap to contract inwardly below the lower edge of the hat.

4,975,982
TURTLENECK BIB
Linda B. Hughes, 1631 Rugby Rd., Schenectady, N.Y. 12309
Filed May 16, 1989, Ser. No. 353,257
Int. Cl.[5] A41B *13/10*
U.S. Cl. 2—49 R **6 Claims**



1. A turtleneck-bib combination for protecting a child's clothes during feeding comprising:

a shield portion adapted to extend at least over the child's chest;

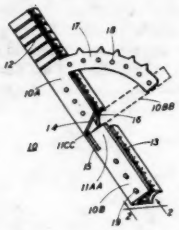
a turtleneck portion having an expansible tubular collar elongated along an axis for loosely fitting around the child's neck, said collar being attached at its one axial end to said shield portion; and

at least one pleat in said collar, which pleat is a fold made substantially transverse to the elongated axis of the collar by doubling the expansible collar over on itself and sewing it together.

4,975,983
SHIRT COLLAR STAY SYSTEM

Robert A. Everett, 704 S. 142 East Ave., Tulsa, Okla. 74108

Filed Jun. 5, 1989, Ser. No. 361,641
Int. Cl.[5] A41D *27/16*
U.S. Cl. 2—60 10 Claims



1. A collar stay for removable attachment to a collar or cuff of a garment, comprising:

an elongated member including a slot-like channel formed by a front leg connected at a first end to a bottom leg extending outwardly therefrom, and a back leg connected at a first end to an opposite edge of the bottom leg, the back leg extending essentially parallel to the front leg;

an indent portion formed in the back leg that contacts an inner surface of the front leg; and

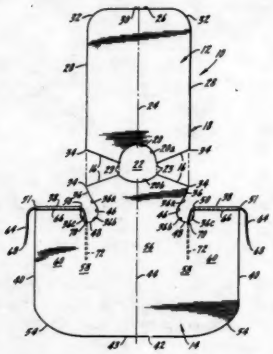
a plurality of ribs on one end of the elongated member rendering the same flexible for permitting the elongated member to curve to fit a rounded portion of a collar or cuff of a garment;

whereby an edge of the collar or cuff can be inserted into the slot-like channel between inner surfaces of the front leg and back leg, and the collar or cuff is held within the channel by the indent portion.

4,975,984
ONE-PIECE GARMENT

Betty J. Sting, Portage, Ind., assignor to Betty Sting Patient Gowns, inc., Portage, Ind.

Filed Jul. 12, 1989, Ser. No. 379,174
Int. Cl.[5] A41D *10/00, 13/00*
U.S. Cl. 2—114 32 Claims



1. A one-piece garment comprising first and second panels defining an interior neck opening between the two panels through which the wearer's neck may extend, the garment further comprising:

an interior neck edge around the neck opening, the neck edge having first and second parts on the first and second panels;

a peripheral edge extending around the first and second panels, the peripheral edge including a first bottom edge and a first pair of spaced side edges extending from the first bottom edge, a second bottom edge disposed opposite to the first bottom edge, a pair of spaced axillar edges extending from the first panel side edges, a pair of transverse edges extending from the axillar edges, and a second pair of spaced side edges extending from the transverse edges to the second bottom edge;

wherein the first panel extends longitudinally between the first part of the neck edge and the first bottom edge and transversely between the first pair of side edges, the first panel being adapted to cover the wearer's chest;

wherein the second panel further includes a central panel, a pair of spaced side panels and a pair of spaced transverse panels, the central panel extending longitudinally between the second part of the neck edge and the second bottom edge and transversely between segments of the axillar edges and between the side panels, the pair of side panels extending longitudinally between segments of the axillar edges and the second bottom edge and transversely between the central panel and the transverse panels, and the pair of transverse panels extending longitudinally between the transverse edges and the second bottom edge and transversely between the side panels and the second pair of side edges;

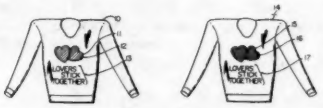
the central panel being adapted to cover the wearer's back and shoulders from the neck edge to the second bottom edge, the side panels being adapted to cover the wearer's sides from under the wearer's armpits down to the bottom edge, and the transverse panels being adapted to substantially cover the wearer's chest;

the garment further including closure means for positioning the transverse panels substantially across the wearer's chest;

4,975,985
NOVELTY CLOTHING

Cynthia C. Stimpson, Box 25365, Seattle, Wash. 98125-2265

Filed Nov. 17, 1989, Ser. No. 440,581
Int. Cl.[5] A41B *1/00, 1/18;* A41D *27/08*
U.S. Cl. 2—115 2 Claims



1. A set of garments comprising a first garment to be worn by a first person and a second garment to be worn by a second person,

said first garment bearing at least one indicium, said indicium on said first garment comprising at least one component of fastening apparatus which comprises hook and loop components,

said second garment bearing at least one indicium, said indicium on said second garment comprising at least one component of fastening apparatus which comprises hook and loop components,

said fastening apparatus components of said indicia being selected to be complementary, whereby when said indicium on said first garment is brought in contact with said indicium on said second garment by said first and second persons, said first and second garments become fastened together.

4,975,986

MEANS FOR REMOVABLY SECURING ACCESSORIES TO WEARING APPAREL AND THE LIKE

Murray Strongwater, 326 Hewlett Neck Rd., Woodmere, N.Y. 11598

Continuation of Ser. No. 245,744, Sep. 6, 1988, Pat. No. 4,847,917. This application Jun. 28, 1989, Ser. No. 372,542
The portion of the term of this patent subsequent to Jul. 18, 2006, has been disclaimed.
Int. Cl.[5] A41D *19/00, 27/08*
U.S. Cl. 2—160 9 Claims

1. An article of wearing apparel adapted to have releasably secured thereto an ornamental accessory comprising,

(a) fastener means having a pair of complementary fastener portions adapted to be selectively engagable or disengagable for securing or releasing said fastener portions, respectively,

(b) one of said fastener portions being secured to the inside of said article of wearing apparel and the other of said fastener portions being adapted to be secured to said ornamental accessory,

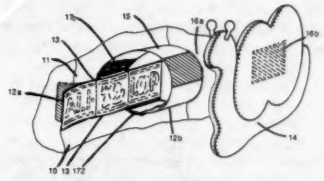
(c) whereby any selected one of a plurality of ornamental accessories provided with said other of said fastener portions is adapted to be releasably secured to said article of wearing apparel to form a combination which simulates an article of wearing apparel having an accessory permanently secured thereto by stitching.

4,975,987

CLOTHING ORNAMENTATION SYSTEM AND ATTACHMENT MECHANISMS

James F. Teachout, and Tammy S. Teachout, both of 3545 E. Ventana Canyon Dr., Tucson, Ariz. 85718

Filed Dec. 2, 1988, Ser. No. 278,719
Int. Cl.[5] A44B *21/00*
U.S. Cl. 2—246 14 Claims



1. A clothing ornamentation system for releasably attaching ornamental elements to articles of clothing comprising, in combination:

an article of clothing,

an ornamental element,

interlocked loops of flexible material which fasten said ornamental element to said article,

one of said loops comprising a receiving loop formed by a flexible receiving strip of the material fixed at opposite end portions to said article in a manner so that said receiving strip extends substantially horizontally when said article is worn by a wearer, and is spaced from said article behind a central portion, to provide a vertically open center, and

another of said loops comprising an attachment loop formed by a flexible attachment strip of the material which extends vertically through the vertically open center of the receiving loop, said attachment strip having releasably secured end portions which allows said portions to be separated and said attachment loop opened and removed from the receiving loop, said attachment loop when interlocked with said receiving loop having a vertical portion in front of said central portion of said receiving loop, and

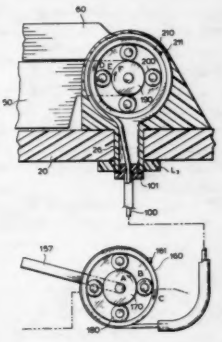
a fastener securing said ornamental element to said vertical front portion of said attachment loop which supports said ornamental element in a position in front said attachment loop.

4,975,988

FOOT-OPERATED TOILET SEAT LIFTING AND LOWERING MECHANISM

Jae-Yop Won, 201 Lambton Avenue, Toronto, Ontario, Canada M6N 2T2, assignor to Jae-Yop Won, Toronto, Canada

Filed Apr. 25, 1988, Ser. No. 186,070
Claims priority, application Rep. of Korea, Sep. 17, 1987, 15844
Int. Cl.[5] A47K *13/10*
U.S. Cl. 4—251 14 Claims



7. For use in lifting or lowering a toilet seat assembly pivotable upon its rear hinge having a central pivot, at least one lever means adapted to be operatively connected with the central pivot, the at least one lever means comprising:

(a) input operating means for activating said lever means;

(b) gearing means engaged to said input operating means comprising a planetary gear system having a sun gear surrounded by at least one planetary gear in contact therewith and a ring gear contacting at least one planetary gear;

(c) output operating means fastened to one of said gear and adapted to be operatively connected with the hinge of the seat assembly in use;

(d) housing means containing said gearing means;

whereby any input displacement, torque, or force applied to said at least one lever means by said input operating means is modified by said lever means, said modified displacement, torque or force being transferred to said output operating means by said gearing means, whereby the hinge of the seat assembly causes movement of the seat assembly when the lever means is used.

4,975,989

DISPOSAL OF WASTE MATERIAL

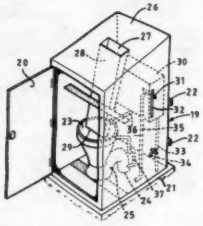
Gary Sutton, 32 Copt Elm Close, Charlton Kings, Cheltenham, Gloucestershire, England

Filed Nov. 29, 1988, Ser. No. 277,410

Claims priority, application United Kingdom, Apr. 20, 1988, 8809296

Int. Cl.[5] **E03D** *5/00*

U.S. Cl. 4—300 **11 Claims**



1. A disposal unit, for the disposal of dog waste, comprising a casing having an openable access door and a fixed upper wall formed with an inlet aperture which is accessible from outside the casing, a receptacle having an upper opening for receiving waste material and being totally enclosed within the casing and spaced below said upper wall thereof, an outlet conduit leading from the receptacle and out of the casing for connection to a sewage system, a trap in said outlet conduit which, in use, is water-filled to prevent the passage of gases from the sewage system along the outlet conduit and into the receptacle, means for supplying water to the interior of the receptacle above the trap so as to flush waste material from the receptacle, and an elongate inlet conduit having an upper end which is secured to said fixed upper wall of the casing and in register with said inlet aperture, said elongate inlet conduit extending downwardly and having a lower end separate from said upper opening and terminating within the boundaries of said upper opening so as to be in fluidic communication with the receptacle, whereby waste material introduced through said inlet aperture falls under gravity down the inlet conduit and into the receptacle.

4,975,990

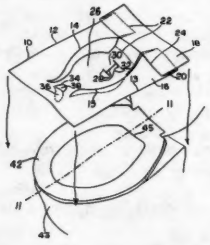
DISPOSABLE, SPLASH-SUPPRESSING TOILET SEAT COVER WITH FOLDED ANNULAR AND BRIDGING INNER PORTIONS

Paul S. Chan, P.O. Box 1232, Cupertino, Calif. 95014

Filed Feb. 2, 1990, Ser. No. 473,869

Int. Cl.[5] **A47K** *13/16*

U.S. Cl. 4—243 **19 Claims**



13. A toilet seat cover for a toilet having a bowl containing water at a predetermined level, said cover comprising:

a sheet of disposable, flexible material having a size, when flat, sufficient to cover a toilet seat of a predetermined size,

said sheet having, in its plan view when flat, a continuous, integral, joint-and seam-free annular perimeter portion and an inner portion surrounded by said annular perimeter portion,

said inner portion being elongated and having opposite ends integrally and continuously attached to said annular portion so as to provide an integral bridge across said annular portion, said inner portion having side edges, between said opposite ends, which are free of said annular portion,

means for allowing said inner portion to drop below said annular portion, said means comprising a plurality of folds extending generally transverse to the direction of elongation of said inner portion, said folds being at one end of said sheet, extending across said inner portion and said annular portion, and being arranged in a zig-zag manner so that said sheet has a portion comprising three sequential, parallel adjacent layers, said portion being bounded by said folds, such that when said annular portion is placed upon a toilet seat, said inner portion will unfold and drop below said seat and into said toilet above said predetermined level,

whereby when said toilet seat cover is placed upon a toilet seat, it can be rapidly deployed and said inner portion will automatically drop below said seat to provide a fecal splash suppressor, and said cover can be made without gluing.

4,975,991

BATHTUB SEAT APPARATUS

Alan D. Peterson, 614 Hermitage Park Dr., Hermitage, Tenn. 37076

Filed Dec. 29, 1989, Ser. No. 459,206

Int. Cl.[5] **A47K** *3/022, 3/12*

U.S. Cl. 4—579 **3 Claims**

1. A bathtub apparatus comprising, in combination,

a central planar seat, and

a respective first and second wing member fixedly mounted to each side of the planar seat and extending outwardly therefrom, and

a respective first and second support framework integrally mounted to a forward bottom end edge of each respective first and second wing member, and

a respective first and second cushioned tubular support mounted in a surrounding relationship to a respective first and second base member of each respective first and second support framework, and

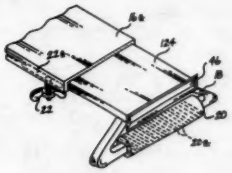
each tubular support includes a planar ribbed bottom surface, and

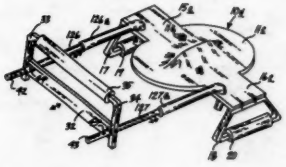
wherein mounting of each respective first and second wing member includes a respective first and second tubular support, each respective first and second tubular support telescopingly receiving each respective first and second wing member therewithin, and each respective first and second tubular support fixedly mounted to an opposed side of the planar seat, and

the planar seat is configured of an elliptical configuration, with each respective first and second tubular support aligned with the minor axis defining the elliptical seat, and the elliptical planar seat further including a ridge extending upwardly of the planar seat aligned with a major axis defining the elliptical planar seat, and a matrix of drainage apertures directed through the elliptical planar seat, and a respective first and second support framework defined at a trapezoidal configuration with the respective first and second base member defining a bottom link of each trapezoidal support framework, and

wherein each respective first and second wing member is selectively clamped interiorly of each respective first and second tubular support, including a threaded boss mounted to each respective first and second wing member extending through a respective first and second slot di-

rected through the respective first and second tubular supports, and a clamping portion associated with each threaded boss to secure the respective first and second wing member relative to each respective first and second tubular support, and





wherein each respective first and second wing member includes a respective first and second elongate suction cup coextensive with each end surface of each respective first and second wing member.

4,975,992

PORTABLE SHOWER STALL

James Patterson, and Julia H. Patterson, both of 2695 Calle Quebrada, San Diego, Calif. 92139

Filed Oct. 30, 1989, Ser. No. 428,939

Int. Cl.*[5] *A47K 3/23

U.S. Cl. 4—599 **1 Claim**

1. A portable shower stall comprising:

(a) a ceiling panel;

(b) a base panel having an upright peripheral flange to define a basin;

(c) said panels having platform dimensions such that they will clamshell together to define a compartment, and including latch means for releasibly holding said panels together;

(d) collapsible supports for supporting said ceiling panel spaced far enough said base panel that a standing person will fit beneath said ceiling panel while standing on said base panel;

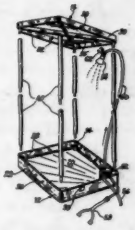
(e) said supports being dimensioned such that when collapsed, they will fit within said compartment;

(f) a curtain dimensioned to substantially span between said panels around the peripheries thereof to define a shower enclosure;

(g) a shower head;

(h) hose means for connecting said shower head to a water source, and water removal means for removing water from said basin;

(i) said compartment being of sufficiently large dimensions



to contain said hose means, water removal means, collapsible supports and curtain, when clamshelled together

(j) said base panel defining a mount for said water removal means, and said water removal means comprising a sump pump;

(k) said sump pump being removable from said mount and being driven by a water motor powered by water provided to said shower head, wherein said hose means for connecting said shower head passes through said motor to power same such that substantially all of the water to power said motor is delivered to said shower head, and said pump is connected to a drain for emptying into a sink drain.

4,975,993

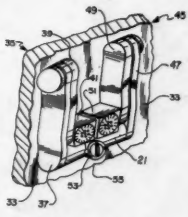
DUAL-HEADED SHOWER DEVICE

David Black; Caron J. Black, both of 1021 Valencia Ave., Coral Gables, Fla. 33134, and Daniel E. Williams, 2424 S. Dixie Hwy., Miami, Fla. 33133

Filed Dec. 27, 1988, Ser. No. 289,835

Int. Cl.*[5] *A47K 3/22

U.S. Cl. 4—601 **5 Claims**



1. A shower device for connection to a stationary water outlet that occupies a fixed projection position relative to a substantially vertical wall comprising:

A. a T-connection having a central opening adapted for connection to said water outlet, and first and second side openings facing sidewardly in opposite directions along a common horizontal axis substantially parallel to said wall,

B. a first shower-head assembly including a first shower-

head, a first rigid lower arm and a first rigid upper arm, one end of said first lower arm being rotatably connected to said first shower-head with its opposite end being rotatably connected to one end of said first upper arm, the opposite end of said first upper arm being rotatably connected to said first side opening of said T-connection to permit said first shower-head to be adjustably disposed at any desired position within a sector of a predetermined radius that extends from said horizontal axis of said T-connection and lies in a first plane substantially perpendicular to said wall, and first means for conducting water inside said first assembly from said T-connection to said first shower head,

C. a second shower-head assembly including a second shower-head, a second rigid lower arm and a second rigid upper arm, one end of said second lower arm being rotatably connected to said second shower-head with its opposite end being rotatably connected to one end of said second upper arm, the opposite end of said second upper arm being rotatably connected to said second side opening of said T-connection to permit said second shower-head to be adjustably disposed at any desired position within a sector of a predetermined radius that extends from said horizontal axis of said T-connection and lies in a second plane substantially perpendicular to said wall, and second means for conducting water inside said second assembly from said T-connection to said second shower-head and,

D. valve means connected to said T-connection for selectively permitting the flow of water from said central opening through at least one of said first water-conducting means, said second water-conducting means, and both said first and second water-conducting means, such that said first and second shower-head assemblies can be positioned at different heights to bathe two users of different heights simultaneously.

4,975,994

HAMMOCK WITH FRAME

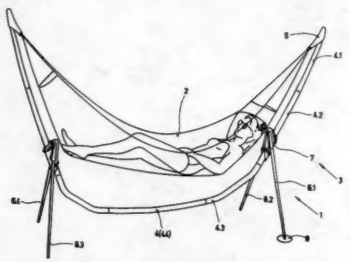
Peter Barmettler, Allmendstrasse 9, CH-6374 Buochs, Switzerland

Continuation of Ser. No. 199,944, May 27, 1988, abandoned. This application May 21, 1990, Ser. No. 526,672

Claims priority, application Switzerland, Jun. 6, 1987, 02135/87

Int. Cl.[5] A45F *3/22, 3/24*

U.S. Cl. 5—120 **10 Claims**



1. The combination of a hammock and a frame for supporting the hammock, said frame comprising:

a flexible beam having a keel like shape with a lowermost central portion from which extend upwardly swept ends,

a plurality of legs each having one end for contacting the ground and the other end for supporting the beam, means for attaching the other end of each of the legs to the beam, the length of each of the legs being such that the beams lowermost central portion is above the ground when there is no load on the hammock,

a hammock for suspension between the ends of the flexible beam, loading of the hammock causing the beam parts off of the ground to deform in a direction to lower the hammock and to deflect the lowermost central portion of the beam toward the ground.

4,975,995

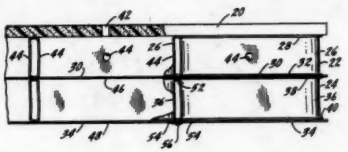
WATER MATTRESS WITH VERTICALLY DISPOSED DAMPENING CELLS

Jeffrey J. Luchonok, Torrance, Calif., assignor to Advanced Sleep Products, Carson, Calif.

Filed Sep. 11, 1989, Ser. No. 405,450

Int. Cl.[5] A47C *27/08*

U.S. Cl. 5—450 **7 Claims**



1. A waterbed mattress having a baffle structure comprising:

(a) a buoyant pad capable of floating freely within the mattress,

(b) a plurality of chambers, an upper portion of which depend from and are attached to said buoyant pad, a lower portion of said chambers being attached to and depending from said upper chambers, openings connecting said upper and lower chambers for the passage of water therebetween when the weight of a person is placed upon the mattress, the buoyant pad and chambers having sufficient buoyancy that the baffle structure floats, and

(c) a plurality of arms extending outwardly from each of said upper chambers, with the arms of one chamber being connected to the arms of adjacent upper chambers, a plurality of arms extending outwardly from each lower chamber, with the arms of adjacent lower chambers being connected to the arms of adjacent lower chambers.

4,975,996

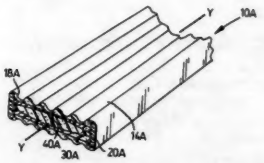
MATTRESS

Alan G. Evans, 213 McCraney Street West, Oakville, Ontario, Canada (L6H 1H8), and Ewan J. Main, 7 Pintail Court, Guelph, Ontario, Canada N1C 1A8

Filed Oct. 3, 1989, Ser. No. 416,464

Int. Cl.[5] A47C *27/16*

U.S. Cl. 5—464 **19 Claims**



1. A mattress formed from foam material comprising:

a foam body having an upper surface for supporting a user and a lower surface for resting on a support, said foam body having a longitudinal axis and including an inner core region formed form one type of foam material, said one type of foam material being firmer than the remainder

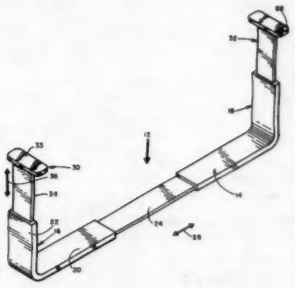
of said foam body, said inner core region extending substantially along the length of said mattress and providing increased support in said mattress along an axis substantially parallel to the longitudinal axis of said mattress.

4,975,997

BEDCLOTHES SUPPORTING DEVICE

Theresa R. Misiura, and Anthony R. Misiura, Sr., both of 265 N. Main St., Moscow, Pa. 18444

Filed Apr. 26, 1990, Ser. No. 514,889
Int. Cl.[5] A47C *21/02*
U.S. Cl. 5—505 3 Claims



1. A bedclothes supporting device comprising:

a U-shaped support which includes

a base section which rests on a box spring or like supporting element, and first and second L-shaped end sections which are located on one side of and outside of the perimeter of a mattress, each L-shaped section having a horizontally-oriented leg and a vertically-oriented leg, with each leg being hollow,

said base section including a connecting element which telescopingly connects to said horizontally-oriented leg of each of said first and second L-shaped end sections and movably coupling said end sections together,

a T-shaped bedclothes-engaging element telescopingly connected to said vertically-oriented leg of each end section and extending upwardly there-from, said T-shaped elements each including a body connected to said end section and a top portion extending transversely of said body, said T-shaped elements being frictionally engaged with said end section vertically oriented sections with sufficient force to support bed clothes, such as sheets, covers and bedspreads above a top surface of a mattress upon which a person rests.

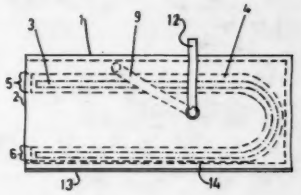
4,975,998

FLUID LEVEL MEASURING STICK CLEANING DEVICE (DIP-SQUEEZE)

Kevin B. Anderson, 3401 Amherst #210, Bedford, Tex. 76021, and Endalkachew Sebhatu, 3031 Ravine Tr., Carrolton, Tex. 75007

Filed Feb. 27, 1990, Ser. No. 485,633
Int. Cl.[5] F01M *11/12;* G01F *23/04*
U.S. Cl. 15—210 B 2 Claims

1. A fluid level measuring stick cleaning device comprised of a container opened at one end and including two oppositely spaced holes formed in the sides thereof, a strip of flexible material, said strip being bent in said container so as to form first and second arms with the opening formed between the arms facing the opening in said container, absorbent means located in the opening formed between said arms, a yoke formed from a strong material, said yoke pivotally extending between said two holes while passing between the container side wall and said first arm, one end of said yoke passing through one of said holes and bending upwards to form a lever, said lever extending in a direction to form an angle with said



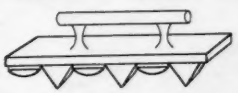
yoke, said second arm being attached to the inside of said container and securing means attached to the outside of said container.

4,975,999

KEYBOARD CLEANER

Edward H. Levy, Brooklyn, N.Y., assignor to EHL Development Inc., Brooklyn, N.Y.

Division of Ser. No. 173,270, Mar. 25, 1989, Pat. No. 4,864,677.
This application Jun. 30, 1989, Ser. No. 374,089
Int. Cl.[5] A47L *25/00*
U.S. Cl. 15—210 R 15 Claims



1. A device for cleaning the keys of a data-entry type keyboard, comprising:

a head structure having a plurality of cleaning substructures extending outwardly from said head structure along a single row, said substructures including a plurality of first cleaning substructures having a common first shape and at least one second cleaning substructure having a second shape geometrically different from said first shape, said second cleaning substructure being disposed between said first cleaning substructures along said row; and

means attached to said head structure for facilitating a gripping of the device.

4,976,000

DEVICE ADAPTED FOR CLEANING DUST, GRIME AND THE LIKE FROM A SURFACE SUCH AS A SKYLIGHT

Jeffrey D. Wiley, 7625 E. Steele St., Littleton, Colo. 80122

Filed May 18, 1989, Ser. No. 353,489
Int. Cl.[5] A47L *1/06, 13/16*
U.S. Cl. 15—220 R 25 Claims

1. A device adapted for cleaning dust, grime and the like from a surface comprising:

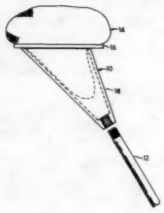
a base;

a plurality of pellets;

a flexible pouch enclosing said pellets in a loose and non-ordered state such that the shape of the peripheral surface of said pouch is deformable;

means for attaching said pouch to said base;

a flexible, removable cover adapted to surround at least a portion of said pouch; and



means for selectively maintaining said cover in a condition of surrounding at least a portion of said pouch.

4,976,001

WIPER BLADES, SPRING ELEMENTS AND ARTICLES INCLUDING SUCH SPRING ELEMENTS

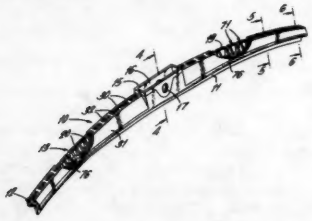
Charles W. Wright, Hough, England, assignor to Tamworth Plastics Limited, Apollo, England

Filed Nov. 4, 1988, Ser. No. 267,305

Claims priority, application United Kingdom, Nov. 7, 1987, 8726140

Int. Cl.[5] A47L *1/02*

U.S. Cl. 15—250.2 **12 Claims**



12. A wiper blade assembly comprising an elongate flexible spine having a continuous lower portion extending along the length of the spine, a number of abutments formed along at least a part of the length of the upper portion of the spine, the abutments being spaced apart to provide pairs of opposed abutment faces which move toward any away from each other with flexing of the spine, and resilient biasing means interposed between said opposed abutment faces, and an elongate blade extending along the length of the lower portion of the spine for wiping a surface, said blade thereby projecting from the spine on the opposite side from the side in which the opposed abutment faces are formed, said spine and blade assembly, with said resilient biasing means interposed between said abutment faces, having a curved configuration when said spine and blade are not subjected to any external force, the lower portion of said spine maintaining the blade in said curved configuration and said biasing means being separate and distinct from said blade, and said biasing means resisting a reduction in curvature of the spine and blade so that when the blade assembly is pressed by an external force towards a surface of lesser curvature, the resultant stressing of the biasing means distributes the external force along at least said part of the length of the assembly thereby holding the blade against the surface.

4,976,002

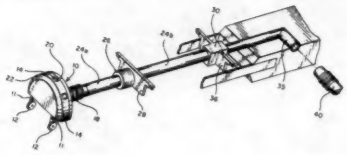
TUBE PARTICLE VACUUM CLEANER

Mark Leonov, and Roy de Groot, both of Santa Clara, Calif., assignors to Intel Corporation, Santa Clara, Calif.

Filed Dec. 2, 1988, Ser. No. 279,412

Int. Cl.[5] B08B *9/02*

U.S. Cl. 15—304 **15 Claims**



1. A vacuum device, comprising:

A vacuum head;

an alignment means connected to said head for placing said head in a predetermined position with respect to a surface to be cleaned;

a vacuum tube flexibly connected to said head;

a mounting means for supporting said tube on an external stand;

a coupling means connected to said mounting means for rotatably connecting said tube to said mounting means.

4,976,003

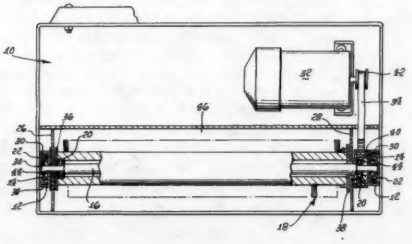
CLEANING APPARATUS

William H. Williams, 4938 Golden Arrow Dr., Rancho Palos Verdes, Calif. 90274

Filed Apr. 11, 1990, Ser. No. 507,641

Int. Cl.[5] A47L *5/30, 9/04*

U.S. Cl. 15—372 **11 Claims**



1. In a vacuum cleaning apparatus of the dry, wet and wet/dry types having a cleaning head assembly, a rotatable brush carried on a stationary horizontal shaft within and spanning said head assembly, said brush being adapted to loosen and agitate dirt on a surface to be cleaned, means for rotatably driving said brush, a dirt collection zone, and vacuum means communicating with the interior of said cleaning head assembly for sucking up dirt and carrying it to said dirt collection zone, the improvement comprising said rotatable brush being movable toward and upwardly from said surface to be cleaned independently at each of its ends within said head assembly in response to variations in the surface or nap height of rug to be cleaned to automatically maintain contact between said brush and the surface to be cleaned and including sliding shaft blocks at each end of said shaft, said sliding shaft blocks being carried by resilient spring means connected to said head assembly and

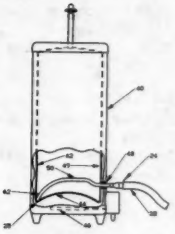
said sliding shaft blocks being vertically slidable with respect to said head assembly.

4,976,004

APPARATUS AND METHOD FOR CLEANING HOT WATER HEATER TANKS

Barbara A. Bufford-Thacker, P.O. Box 344, Hartland, Mich. 48029

Filed Oct. 11, 1988, Ser. No. 255,592
Int. Cl.[5] A47L 9/02
U.S. Cl. 15—415.1 **2 Claims**



1. Apparatus for the suction removal of deposits from the bottom of the tank of a drained hot water heater through an access opening in the side of the heater above the bottom of the tank, comprising:

a tubular tool provided with a cylindrical connector end adapted to be coupled to a vacuum cleaner suction attachment, a body, and an intake end on said body opposite to said connector end, said body having a length greater than the diameter of said tank;

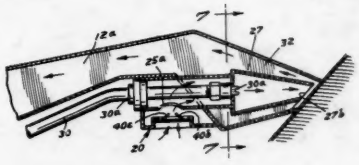
said body comprising a reducer extending from said connector end and a tube of lesser diameter extending from said reducer to said intake end, said tube including a portion coaxial with and adjacent to said connector end and an offset portion extending curvilinearly from said coaxial portion to said intake end, said offset portion projecting laterally from the coaxial line a distance correlated to the vertical dimension between said access opening and the bottom of the tank whereby said tool is positionable through said access opening with said intake end in contact with any desired portion of the bottom of said tank.

4,976,005

CLEANING TOOL WITH DEMAND-RESPONSIVE AIR PORT

Dale L. Graye, P.O. Box 703, Wayzata, Minn. 55391

Filed Jun. 12, 1989, Ser. No. 364,857
Int. Cl.[5] A47L 7/00
U.S. Cl. 15—322 **2 Claims**



1. In connection with a fluid vacuum type cleaning apparatus, a cleaning tool comprising

a hood having a chamber therein and forming a nozzle at its forward end,

a tubular member communicating with said chamber and extending rearwardly of said hood to a suction source,

a cleaning fluid line from a fluid source extending into said fluid chamber,

a restrictive demand responsive air port open to the atmosphere communicating with said fluid chamber,

a suction passage between said fluid chamber and said hood running to said tubular member from said nozzle,

said demand responsive air port comprises a diaphragm having a pair of torsion spring restrained flaps flexing to have a restricted response to suction exerted thereupon.

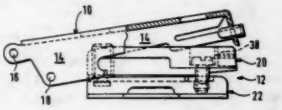
whereby the suction drawn upon said nozzle determines the demand for air upon said air port and the air supplied by said port.

4,976,006

FURNITURE HINGE

Karl Lautenschläger, Reinheim, Fed. Rep. of Germany, assignor to Karl Lautenschlager GmbH & Co. KG., Reinheim, Fed. Rep. of Germany

Filed Jun. 14, 1989, Ser. No. 365,969
Claims priority, application Fed. Rep. of Germany, Jun. 15, 1988, 3820338
Int. Cl.[5] E05D 7/04, 7/12
U.S. Cl. 16—238 **14 Claims**



1. A hinge for hanging a door on a carcase of a piece of furniture, said hinge comprising a door-related hinge part adapted to be fastened to the door, a mounting plate, a carcase-related hinge part adapted to be placed removeably on said mounting plate, adapted to be coupled to the door-related part by a linking mechanism, and configured as a supporting arm having an inverted U-shaped cross section straddling the mounting plate, said mounting plate being composed of two mounting plate members which are separable from one another and adjustable relative to one another, one of said mounting plate members being a bottom part adapted to be affixed to a supporting wall of the carcase, and the other being an upper part more remote from the wall than said bottom part, a catch mechanism releasably joining the upper part tot he supporting arm, in a cabinet-exterior end area of the upper mounting plate member nearer the door, said supporting arm partially straddling the upper mounting plate member at least at a cabinet-interior end area thereof remote from the door, said catch mechanism comprising two tongues on said supporting arm, respectively resiliently flexible parallel to the supporting wall, each tongue having a catch section, each catch section being held by form locking by an associated catch recess in the upper mounting plate member in a connecting position of the arm and upper mounting plate member, the catch sections and catch recesses being disengageable by flexing the tongues against one another parallel to the supporting wall, each tongue having a handle for exerting a pressure against one another parallel to the supporting wall.

4,976,007

CONNECTING DEVICE FOR PORTABLE COMPUTERS

Pak-Lee Lam, Taipei, Taiwan, assignor to Quanta Computer Inc., Taipei, Taiwan

Filed Jun. 22, 1989, Ser. No. 369,961
Int. Cl.[5] E05F 1/08; E05C 17/64
U.S. Cl. 16—302 **4 Claims**

1. A connecting device for portable computers, comprising:

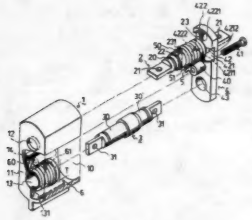
a housing unit having an open section formed at one side thereof, a pivot opening, a bolt hole which passes through

a bolt stud, and a blind screw hole respectively provided at another side thereof for making connections therewith;

a first pivot means movably disposed in said pivot opening through the open section of said housing unit for making pivotal connections therewith;

a second pivot means movably disposed in the bolt hole of said bolt stud through the open section of said housing unit for making pivotal connections therewith in conjunction with said first pivot means;

a linking member formed in conjunction with the open section of said housing unit, having an upper through hole, a lower through hole and a stud hole respectively provided therein being connected to said housing unit in



the open section thereof through said stud hole and said blind hole with rear neck portions of said first and second pivot means separately located in said upper and lower through holes;

a first torsional means closely disposed around a middle portion of said first pivot means in a forward direction for providing a twisting force therewith in connection with a pivoting movement of said first pivot means; and

a second torsional means closely disposed around said bolt stud of said housing unit in a reverse direction in connection with said second pivot means for providing another twisting force therewith; whereby, different turning movements of said first and second pivot means can be effected through said first and second torsional means.

4,976,008

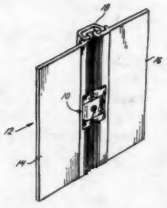
MULTI-PIECE THRUST BEARING ASSEMBLY FOR A HINGE STRUCTURE

Austin R. Baer, 1115 N. Ellsworth, Villa Park, Ill. 60181

Filed Nov. 6, 1989, Ser. No. 432,575

Int. Cl.[5] E05D *1/00*

U.S. Cl. 16—354 **12 Claims**



1. A multi-piece thrust bearing assembly for a pinless hinge structure including two intermeshed geared hinge members which are longitudinally movable relative to each other and a clamp member for maintaining the geared hinge members in mesh as they rotate, each geared hinge member including a gear segment extending along a longitudinal edge thereof, and an outwardly extending leg portion, said bearing assembly comprising:

bearing means disposed in adjacent longitudinal co-extensive lateral recesses defined along adjacent longitudinal edges of each hinge member and extending laterally across each gear segment of said hinge members to inhibit longitudinal movement of the hinge members relative to each other; and

bearing insert means arranged beneath the gear segment of each hinge member and an upper bearing surface of said bearing means and secured to said hinge members for enhancing hinge performance by reducing frictional sliding contact between the hinge members and said bearing means.

4,976,009

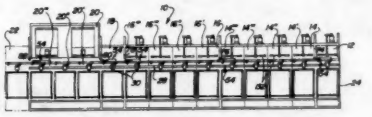
SMOKEHOUSE ASSEMBLY

Andrew J. Gladd, Plymouth, Mich., assignor to Gladd Industries, Inc., Detroit, Mich.

Filed Dec. 15, 1989, Ser. No. 451,087

Int. Cl.[5] A23B *4/04*

U.S. Cl. 452—198 **19 Claims**



1. A multi-product meat processing assembly **(10)** of the type for smoking meat, said assembly comprising a plurality of sequentially adjacent chamber **(12, 14, 16, 18, 20, 22)** in which temperature, humidity and smoking can be varied; transfer means **(26)** for carrying meats through said chambers **(12, 14, 16, 18, 20, 22)** sequentially to predetermined positions in each of said chambers; and indexing means **(54)** for indexing said transfer means **(26)** at said predetermined positions within each of said chambers, said indexing means **(54)** including reciprocating push/pull means having a neutral position for engaging said transfer means **(26)** to the sequentially next of said predetermined position, said push/pull means being releasable from said transfer means **(26)** to return to said neutral position to engage another one of said transfer means **(26)**.

4,976,010

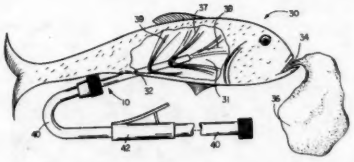
METHOD FOR FISH CLEANING

Edwin F. Lavelle, Jr., 31 Diamond St., North Chelmsford, Mass. 01863

Filed Jul. 28, 1989, Ser. No. 387,065

Int. Cl.[5] A22C *25/18*

U.S. Cl. 452—116 **1 Claim**



1. A method for gutting fish comprising the steps of: entering in a non-damaging manner, using a means for entering, the body cavity of a fish through the anus of said fish; providing pressurized water into said body cavity through said means for entering; activating flow of said pressurized water; and directing, by direction of said means for entering, flow of said pres-

surized water into said body cavity to dislodge and flush viscera out through the mouth of said fish.

4,976,011

APPARATUS FOR COLLECTING ROE AND FISH BODY PROCESSING MACHINE USING THE SAME

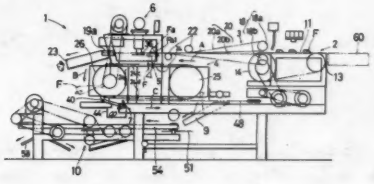
Yutaka Ogawa, Ibaraki, Japan, assignor to Nippon Fillestar Co., Ltd., Osaka, Japan

Filed Jul. 7, 1989, Ser. No. 376,597

Claims priority, application Japan, May 12, 1989, 1-120175

Int. Cl.[5] A22C *25/14*

U.S. Cl. 452—110 **6 Claims**



1. An apparatus for collecting roe, comprising:

means for holding and conveying a decapitated fish body by its tail such that the head end of the fish body faces downward; and

collecting means for collecting roe from a decapitated fish body conveyed by said means for holding and conveying, said collecting means comprising a collecting member positioned so as to abut against the abdomen of the decapitated fish body, said collecting member being yieldably biased in a direction toward the path of said means for holding and conveying so as to be freely movable in a direction intersecting said path of said means for holding and conveying.

4,976,012

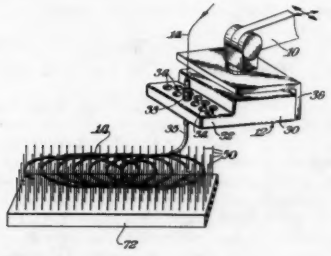
METHOD OF FORMING A WEB

Ronald F. McConnell, West Chester, Pa., assignor to E. I Du Pont de Nemours and Company, Wilmington, Del.

Continuation-in-part of Ser. No. 445,166, Nov. 29, 1982, Pat. No. 4,715,924. This application Mar. 30, 1987, Ser. No. 31,794

Int. Cl.[5] D01G *25/00*

U.S. Cl. 19—299 **8 Claims**



1. A method of producing a nonwoven web comprising:

providing a plate having a perforated, elastomeric sheet adhered thereto with deflectible pins resiliently mounted in said perforations,

providing a robotized head for depositing a continuous strand in a programmed pattern,

wherein said head includes a freely rotatable, strand guiding tube projecting therefrom and terminating in a horn having a curved length, and

lowering said horn below the tops of the pins and then depositing said strand from said horn in between said pins according to said programmed pattern.

4,976,013

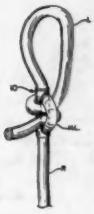
ROPE-TYING DEVICE AND METHOD

Cyrus T. Wax, Skokie, Ill., assignor to Scully-Jones, Corp., Chicago, Ill.

Filed Feb. 7, 1990, Ser. No. 476,327

Int. Cl.[5] F16G *11/00*

U.S. Cl. 24—129 R **3 Claims**



1. A rope-tying device for forming a loop in the free end portion of a rope, comprising:

a unitary, generally cylindrical tubular body formed of a single piece of material and defining an inside cross-section area large enough to receive said free end portion of said rope therethrough,

said tubular body defining a pair of longitudinally extending, diametrically opposed, spaced apart slots, said tubular body thereby including a pair of annular, cylindrical end body portions at respective opposite ends of said pair of slots, and each having a substantially constant inside diameter through which said rope in insertable, and a pair of diametrically opposed, spaced apart side body portion each extending between said end body portion in alternating relationship with said slots, each of said side body portions comprising a cylindrical section;

each of said slots being straight-sided, and longitudinally-centered with respect to the length of said tubular body, each said slot having a transverse dimension substantially equal to the nominal diameter of said free end portion of said rope, and a length substantially equal to 4 times the nominal diameter of said free end portion of said rope, so that each said slot extends along a major portion of the length of said tubular body and is sufficiently large so as to receive a half-loop of said rope laterally from within said tubular body, through either selected one of said slots to thereby facilitate formation of said loop with the free end portion of said rope that extends through and beyond said tubular body.

4,976,014

AUTOMATIC LOCK SLIDER FOR SLIDE FASTENER

Shunji Akashi, Kurobe, and Kiyoshi Oda, Namerikawa, both of Japan, assignors to Yoshida Kogyo K. K., Tokyo, Japan

Filed Oct. 23, 1989, Ser. No. 424,993

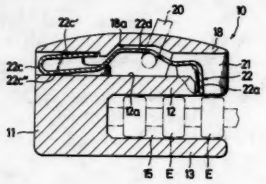
Claims priority, application Japan, Oct. 26, 1988, 63-139882[U]

Int. Cl.[5] A44B *19/30*

U.S. Cl. 24—421 **8 Claims**

1. An automatic lock slider for slide fastener which comprises a slider body including a pair of parallel spaced upper and lower wings joined at their front end by a neck so as to define therebetween a guide channel for the passage of a pair of opposed rows of coupling elements, a support lug integral with

and disposed over the top surface of said upper wing, a pull tab pivotally supported in said lug, and a locking member in the form of a polygonal leaf spring having at one end an integral locking pron normally urged into said guide channel and at the other end a U-bent spring portion and a bulged portion intermediate said prong and said U-bent portion, said bulged portion being spaced apart from the lower surface of said lug by a sufficient distance to permit lifting of said locking prong clear out of said guide channel, and said U-bent portion being spaced slightly apart from the lower surface of said lug and from the top surface of said upper wing, respectively.



4,976,015

SLIDER PULL TAB FOR SLIDE FASTENER

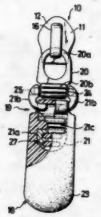
Susumu Ishii, Kurobe, Japan, assignor to Yoshida Kogyo K. K., Tokyo, Japan

Filed Oct. 31, 1989, Ser. No. 429,610

Claims priority, application Japan, Nov. 15, 1988, 63-148914[U]

Int. Cl.[5] A44B *19/26*

U.S. Cl. 24—429 **6 Claims**



1. A slider pull tab for slide fastener which comprises a connector means, a decorative portion integral therewith and exposed to view at least on one surface of said connector means, and a grip web formed from an elastic soft-type resinous material, said connector means having a through opening or aperture which is filled by the resinous material of said grip web, wherein said through-opening or aperture is formed in and extends transversely clear through said decorative portion, and extends clear through the thickness of said connector means.

4,976,016

SEPARABLE SLIDE FASTENER

Hideo Takabatake, Namerikawa, Japan, assignor to Yoshida Kogyo K.K., Tokyo, Japan

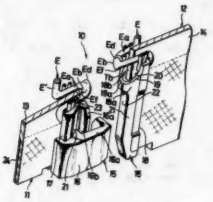
Filed Nov. 2, 1989, Ser. No. 430,289

Claims priority, application Japan, Nov. 8, 1988, 63-282165

Int. Cl.[5] A44B *19/36*

U.S. Cl. 24—433 **6 Claims**

1. A separable slide fastener comprising a pair of opposed stringers each including a tape and a row of coupling elements secured along one longitudinal edge of said tape, and each of said coupling elements having a coupling head with upper and lower hook portions, a slider movable reciprocably on and along said pair of stringers, and a separable bottom-end-stop assembly comprising a socket member fixedly connected to a lower end portion of one said stringer, a socket pin member integral with and projecting from said socket member and a guide pin member fixedly connected to a lower end portion of the other said stringer and releasably engageable with said socket member, said guide pin having has a bulged upper end portion which is beveled to provide a cross-sectionally semicircular opening for receiving the coupling head of a lowermost terminal element in said row of elements on one of said stringers.



4,976,017

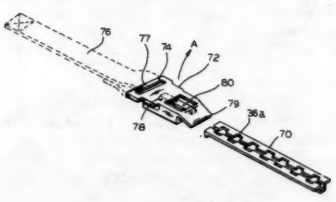
ADJUSTABLE WAISTBAND ASSEMBLY

Frank Frano, Hoffman Estates, Ill., assignor to Illinois Tool Works, Inc., Chicago, Ill.

Filed May 12, 1988, Ser. No. 194,433

Int. Cl.[5] A44B *11/25*

U.S. Cl. 24—585 **20 Claims**



1. A two-piece adjustable fastener assembly for use upon a clothing article band having an underlying part and an overlying part, comprising:

a track member, having a plurality of recesses formed therein, being securable to said underlying part of said clothing article band; and

a latch member, being securable to said overlying part of said article band and adjustably engageable with said track member so as to define therewith said two-piece adjustable fastener, and including first means for engaging an undersurface portion of said track member; pawl means for selectively engaging any one of said plurality of recesses formed within said track member so as to provide adjustable positional movement and engagement of said latch member and said overlying part of said article band with respect to said track member and said underlying part of said article band; and second means, integrally interconnecting said first means and said pawl means such that said first means, said pawl means and said second means form a one-piece latch member, for engaging an upper surface portion of said track member so as to cooperate with said first means engaging said undersurface portion of said track member whereby said second means is resiliently deformably moved in a first direction away

from said first means so as to cause said latch member to be resiliently, yet releasably, biased for movement in a second direction, opposite to said first direction of said second means, toward said first means and into engagement with said any one of said plurality of recesses formed within said track member.

4,976,018

DEVICE FOR MONITORING THREADS ON A TEXTILE MACHINE

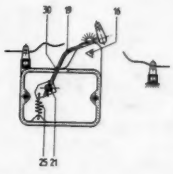
Manfred Bollen, Oberuzwil, Switzerland, assignor to Benninger AG, Uzwil, Switzerland

Filed Oct. 11, 1989, Ser. No. 419,712

Claims priority, application Switzerland, Oct. 19, 1988, 3891/88

Int. Cl.[5] B65H *63/02;* **D02H** *13/06;* **D01H** *13/16*

U.S. Cl. 28—187 **11 Claims**



1. A device for monitoring threads on a textile machine, in particular a warp system, with a monitoring needle (19) which rests on the thread (5) in the operating position, is mounted on a shaft (21) running transverse to the thread direction, and is pivotable in the case of a thread breakage from the operating position to an alarm position, in which case a control signal is triggered, characterised in that on one side of the thread path is mounted a light receptor (16) and on the other side a light emitter (17) directed at the receptor, and in that the light beam (29) emissible by the light emitter runs through the plane of the thread and through the pivotal range of the monitoring needle (19) between the operating position and the alarm position, the control signal being capable of being triggered by an irregularity in the thread in the plane of the thread or by the pivotal movement of the monitoring needle (19).

4,976,019

MACHINING CENTER

Koichiro Kitamura, Takaoka, Japan, assignor to Kitamura Machinery Co. Ltd., Tokyo, Japan

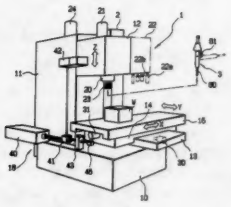
PCT No. PCT/JP88/00248, § 371 Date Aug. 15, 1989, § 102(e) Date Aug. 15, 1989, PCT Pub. No. WO88/06947, PCT Pub. Date Sep. 22, 1988

PCT Filed Mar. 10, 1988, Ser. No. 397,421

Claims priority, application Japan, Mar. 13, 1987, 62-56431

Int. Cl.[5] B23Q *17/20*

U.S. Cl. 29—26 A **12 Claims**



1. A machining center comprising:

(a) a base;

(b) a column fixed to the base;

(c) a spindlehead slidably mounted to the column along a first-direction and having a spindle;

(d) a table for detachably supporting a workpiece thereon;

(e) a first supporting means slidable along a second-direction for supporting the table;

(f) a second supporting means slidable along a third-direction for supporting the first supporting means;

(g) a probe means for detachably mounting in the spindle;

(h) a first moving means for moving the spindlehead so as to cause relative motion between the probe means mounted in the spindle and the workpiece on the table along the first-direction;

(i) a second moving means for moving the first supporting means so as to cause relative motion between the probe means mounted in the spindle and the workpiece on the table along the second-direction perpendicular to the first-direction;

(j) a third moving means for moving the table so as to cause relative motion between the probe means mounted in the spindle and the workpiece on the table along the third-direction perpendicular to both the first-direction and the second-direction;

(k) a laser length measuring machine for measuring distances of the relative motion between the probe means mounted in the spindle and the workpiece on the table along the first, second and third directions, the laser length measuring machine comprising;

(1) a laser head having a laser light source and a receiving means, the laser head being fixed relative to the column;

(2) a splitter means for splitting laser light from the laser light source into plural laser beams, the splitter means being fixed relative to the base; and

(3) reflecting means for travelling the laser beams through the splitter means to the receiving means, respectively, by reflecting the laser beams, the reflecting means being operatively associated with each of the first, second and third-directions and being movable relative to the laser light source in response to the relative motion between the probe means and the workpiece, one of the reflecting means being positioned at the spindlehead, another of the reflecting means being positioned at the first supporting means, and a third of the reflecting means being positioned at the table;

(l) a counter means being fixed relative to the base for counting signals from the receiving means, so as to convert the signals into distance information, along the first, second and third-directions; and

(m) a data processing means being fixed relative to the base for observing the geometrical shape of the workpiece according to both a contact signal from the probe means and the distance information from the counter means.

4,976,020

MAGNETIC SHEET POLISHING DEVICE

Yasuo Nagashima; Haruo Soeda; Masamichi Sato, all of Tokyo, and Takashi Kubo, Kanagawa, all of Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Continuation of Ser. No. 110,821, Oct. 21, 1987, abandoned. This application Aug. 24, 1989, Ser. No. 398,303

Claims priority, application Japan, Oct. 21, 1986, 61-248280; Oct. 24, 1986, 61-251942

Int. Cl.[5] B24B *39/06;* **B23B** *27/00*

U.S. Cl. 29—90.01 **2 Claims**

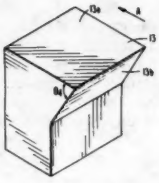
1. A magnetic sheet polishing device for smoothing the surface of a magnetic sheet, said device comprising:

a rotational drive unit for rotating said magnetic sheet;

a head carriage having a base disposed at an end thereof; and

a scraper attached to said base plate for sliding against a surface of magnetic material of the rotating magnetic sheet such that magnetic lumps projecting from said surface of magnetic material are scraped off, said scraper including a substantially flat sliding surface for contigu-

ously sliding against said surface of magnetic material, a downstream side surface intersecting with and disposed nearly perpendicular with respect to said sliding surface as



measured within said scraper, intersecting with an upstream side surface disposed at an acute angle with respect to said sliding surface as measured within said scraper.

4,976,021

FOUNDATION PROCESS FOR ASSEMBLING FURNITURE

Roberto Saporiti, Crenna Di Gallarate; Mauro Lipparini, and Roberto Tapinassi, both of Florence, all of Italy, assignors to Saporiti Italia S.p.A., Besnare, Italy

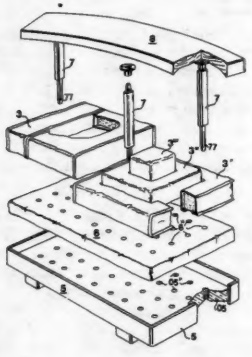
PCT No. PCT/EP88/00779, § 371 Date May 1, 1989, § 102(e) Date May 1, 1989, PCT Pub. No. WO89/01748, PCT Pub. Date Mar. 9, 1989

PCT Filed Aug. 31, 1988, Ser. No. 358,371

Claims priority, application Italy, Aug. 31, 1987, 83652 A/87; Aug. 31, 1987, 83653 A/87

Int. Cl.[5] B24B *39/00*

U.S. Cl. 29—91.1 **14 Claims**



1. A foundation process for assembling furniture, which comprises:

forming a plurality of holes through a base and an elastic layer;

placing said elastic layer atop said base in such a manner as to align the said holes;

placing an arm portion and at least one cushion atop the elastic layer; and

inserting at least one upright vertically through said holes of said base and elastic layer.

4,976,022

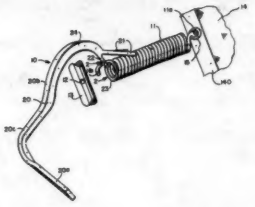
SPRING PULLER

Theodore W. Thornton, 745 Pacific Ave., Salt Lake City, Utah 84104, and Willem E. Leeflang, 3766 Haven Way, Salt Lake City, Utah 84109

Filed Oct. 30, 1989, Ser. No. 429,085

Int. Cl.[5] B23D *19/04*

U.S. Cl. 29—227 **12 Claims**



1. A device for facilitating attachment to or detachment from an anchoring support of an extension type of helical spring provided with anchoring means such as loops, hooks, or eyes at its opposite ends, said device being a hand-held and hand-manipulated tool in the form of a lever of the second kind and comprising a power arm provided with a handle member at one end for grasping by the user of the tool; a work arm provided with means for engaging an anchoring loop, hook, or eye of the spring; and a fulcrum member at the opposite end for bearing against the spring during attachment or detachment thereof relative to the support, all being so constructed and arranged that no part of said device imposes an obstruction between said spring and said support along an axial extension of the axis of said spring.

4,976,023

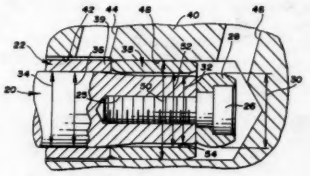
METHOD OF INSTALLING AND SIZING A BUSHING IN A SHAFT

Peter G. McKee, Franklin, Tenn., assignor to Saturn Corporation, Troy, Mich.

Filed Sep. 5, 1989, Ser. No. 402,278

Int. Cl.[5] B21D *41/02*; B23P *19/02*

U.S. Cl. 29—523 **2 Claims**



1. A method of installing and sizing a bushing, to a desired longitudinal position and a desired finish diameter in a deep drill blind passage comprising:

inserting a bushing on an inner mandrel having one end formed with a segmented spheroidal surface of a diameter equal to the desired finished diameter of the bushing and a shaft portion having a diameter accommodating the bushing inner diameter prior to finishing;

installing an outer mandrel over the inner mandrel, said outer mandrel having an outer diameter less than the diameter of the drilled blind passage and an inner diameter not less than the desired finished diameter of the bushing;

pressing the bushing into the drilled blind passage by exert-

ing an axial force on the outer mandrel until the bushing is in the desired longitudinal position in the shaft;

maintaining the outer mandrel in the position establishing the desired longitudinal position;

withdrawing the inner mandrel to force the spheroidal end of the inner mandrel through the bushing to size the inner diameter of the bushing to the desired finished diameter; and

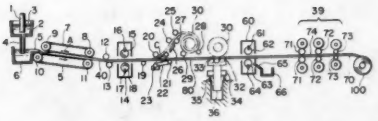
removing both mandrels from the drilled blind passage after the spheroidal end of the inner mandrel has exited from the bushing.

4,976,024

METHOD OF AND APPARATUS FOR ROLLING DIRECTLY COUPLED WITH CONTINUOUS CASTING

Tomoaki Kimura, Hitachi, Japan, assignor to Hitachi, Ltd., Tokyo, Japan

Filed Apr. 5, 1988, Ser. No. 177,773
Claims priority, application Japan, Apr. 8, 1987, 62-84761
Int. Cl.[5] B23B *1/46, 13/22*; B22D *11/126*
U.S. Cl. 29—527.6 **6 Claims**



1. A direct coupling type continuous cast rolling method of rolling, through a rolling line including a rolling machine and other various machines, a high-temperature sheet slab produced from a continuous casting line arranged upstream of said rolling line and including a continuous casting machine, comprising the steps of:

providing said continuous casting line in one common linear row with said rolling line so that said sheet slat continuously produced from said casting line is led directly to said rolling line so as to roll the sheet slab in normal operation;

shearing said slab as it is being continuously produced by said continuous casting machine, on the upstream side of said rolling machine, when the operation of any one of the machines including said rolling machine, disposed downstream of said continuous casting machine is stopped;

coiling said sheared slab to take up all of the slab produced by said continuous casting machine;

uncoiling said coiled slab after the restarting of the operation of said one of the machines shut down; and

supplying said uncoiled slab to said rolling line and effecting a rolling operation with respect to said slab.

5. A direct coupling type continuous cast rolling apparatus for rolling, through a rolling line including a rolling machine, a high-temperature sheet slab produced from a continuous casting line including a continuous casting machine, comprising:

said continuous casting machine and said rolling machine being coupled together so that said rolling line and said continuous casting line are laid in one common linear row,

first and second shearing machines disposed consecutively between said continuous casting machine and said rolling machine, said rolling machine being located downstream of said continuous casting machine;

coiling means and uncoiling means disposed between said shearing machines for taking up a following slab sheared by said first shearing machine and for uncoiling said coiled slab respectively; and

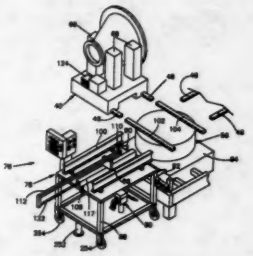
means for changing an advancing direction of said slab sheared by said first shearing machine from a pass line in the direction of said coiling and uncoiling means.

4,976,025

TEST ASSEMBLY FOR MACHINE TOOL HAVING HYDRAULIC PALLET ASSEMBLIES

Billie A. Aldridge, Jr., 4368 Highway 41-A, and Roger J. Stone, 2042 Old Corydon Rd., both of Henderson, Ky. 42420

Filed Sep. 22, 1989, Ser. No. 411,566
Int. Cl.[5] B23Q *7/00*
U.S. Cl. 29—563 **17 Claims**



1. An apparatus for sequentially machining a plurality of workpieces, said apparatus comprising an array of work stations, said array of work stations including a plurality of machining stations, a plurality of hydraulic pallet means for holding workpieces to be machined at said machining stations, each of said hydraulic pallet means including clamp means for gripping a workpiece and hydraulic actuator means for effecting operation of said clamp means between an engaged condition in which said clamp means is effective to grip a workpiece and a disengaged condition in which said clamp means is ineffective to grip a workpiece, at least one of said work stations including means for connecting hydraulic fluid pressure with said hydraulic actuator means to effect operation of said clamp means between the engaged and disengaged conditions, main guide means extending between said work stations for guiding movement of said hydraulic pallet means along a path extending between said work stations, a testing station disposed to one side of the path of movement of said hydraulic pallet means between said work stations, and hydraulic pallet testing means at said test station for testing said hydraulic pallet means, said hydraulic pallet testing means including secondary guide means for guiding movement of said hydraulic pallet means from the path of movement of said hydraulic pallet means between said work stations to said testing station and for guiding movement of said hydraulic pallet means from said testing station back to the path of movement of said hydraulic pallet means between said work stations, and means at said testing station for connecting hydraulic fluid pressure with said hydraulic pallet means to test operation of said hydraulic actuator means under the influence of hydraulic fluid pressure.

4,976,026

METHOD AND APPARATUS OF ESTABLISHING THE POSITION OF A DATUM REFERENCE FROM AN OBJECT HAVING DIMENSIONAL VARIATIONS WITHIN A TOLERANCE RANGE

Ernest A. Dacey, Jr., Highland, Mich., assignor to Utica Enterprises, Inc., Sterling Heights, Mich.

Continuation of Ser. No. 311,166, Feb. 15, 1989, abandoned, which is a division of Ser. No. 59,858, Jun. 8, 1987, Pat. No. 4,813,125. This application Feb. 9, 1990, Ser. No. 483,958
Int. Cl.[5] B23P *19/00*
U.S. Cl. 29—714 **8 Claims**

1. An apparatus for locating a position with respect to an object that is located between a plurality of gauging sites, said apparatus comprising:

a carrier assembly that spans the direction of travel of an

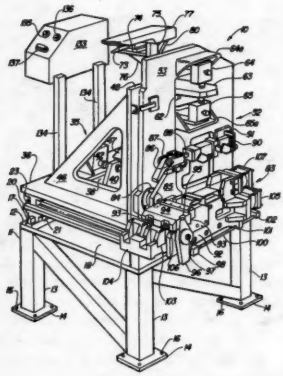
assembly line for said object, said carrier assembly comprising:

at least two columnar members in spaced apart relationship on opposite sides of said assembly line; and

a bridge member interposed between said at least two columnar members;

means for moving said bridge member with respect to said at least two columnar members, said means for moving being located between said bridge member and said at least two columnar members;

a plurality of position detection assemblies juxtaposed said at least two columnar members, said position detection assemblies being positioned in spaced relationship to one



another to permit said assembly line to pass therebetween, said plurality of position detection assemblies mechanically engaging said object to establish locations in space when said object is therebetween;

tool means attached to said bridge member of said carrier assembly so that work can be accomplished on a body of said object that passes in close proximity to said tool means; and

positioning means mechanically interconnecting said tool means to said position detection assemblies for positioning said tool means relative to said locations in space so that work can be performed on said body of said object by said tool means even though said body of said object is not of symmetrical configuration.

4,976,027

DEVICE FOR LINING A PERIPHERAL TUBE OF A STEAM GENERATOR

Jean P. Cartry, and Bruno Fraissenet, both of Lyons, France, assignors to Framatome, Courbevoie, France

Division of Ser. No. 44,255, Apr. 30, 1987, Pat. No. 4,827,594. This application Nov. 28, 1988, Ser. No. 276,846

Claims priority, application France, Apr. 30, 1986, 86 06344

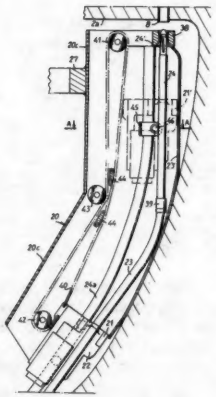
Int. Cl.[5] B23P *15/26*

U.S. Cl. 29—727 **6 Claims**

1. Device for lining a peripheral tube of a steam generator comprising a bundle of parallel tubes having a cross-section of substantially circular shape in which the tubes (8) are uniformly distributed, said tubes being crimped at ends thereof into a circular tube plate (2) having first and second faces over the entire thickness of said tube plate (2) so as to project in relation to said first face (2*b*) of said tube plate, called the exit face, and to be flush with said second face (2*a*) of said tube plate, called entry face, below which said steam generator forms a water box (3) of hemispherical shape, by means of a lining process comprising insertion of a liner (12) into the tube (8) through one of its ends, from the entry face (2*a*) of the tube plate (2), diametral expansion of the liner (12) inside the tube (8), in at least two regions (15, 16) situated adjacent said ends, and crimping by roller-expanding of the tube in each of the expansion regions, said device comprising, in addition to means for performing the insertion and the diametral expansion of the liner (12) and to a manipulator device comprising an arm (40) making it possible to place an appliance in any position vertically below a tube (8) of the bundle, below the entry face (2*a*) of the tube plate, an assembly for handling and for roller-expanding making it possible to insert a roller-expanding tool (24) into a peripheral tube (8), said assembly comprising

(a) a curved structure (20) consisting of two flat side flanges (20*a*, 20*b*), and a curved bottom (23') connected to each of said flanges (20*a*, 20*b*);

(b) a curved guiding slide (24*a*, 24*b*) associated with each of said flanges (20*a*, 20*b*);



(c) a trolley (21) mounted for movement in said curved structure (20) and guided along a curved trajectory substantially along an inner wall of said water box (3), by means of wheels (25, 26) interacting with said guiding slides (24*a*, 24*b*) of said curved structure (20);

(d) means (20, 31, 40, 41) for driving said trolley (21) along said curved slides (24*a*, 24*b*), in either direction;

(e) a roller-expanding device having driving means (22) carried by said trolley (21) and comprising a rigid roller-expanding tool (24) connected to said driving means carried by said trolley, by a flexible tube (23) inside which is placed a flexible cable for driving said roller-expanding tool (24), by means of said driving means (22); and

(f) a device (38) for guiding said roller-expanding tool (24) on leaving said curved structure (20).

4,976,028

FLEXIBLE RAZOR HEAD

Evan N. Chen, Fairfield, Conn., assignor to Warner-Lambert Company, Morris Plains, N.J.

Continuation of Ser. No. 115,781, Oct. 30, 1987, Pat. No. 4,854,043. This application May 18, 1989, Ser. No. 353,840

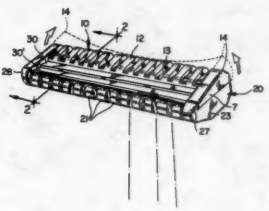
Int. Cl.[5] B26B *21/00*

U.S. Cl. 30—49 **23 Claims**

1. A flexible razor head comprising:

(a) a cap having a fixed length which does not change when said razor head is flexed;

(b) a seat comprising a plurality of support portions and a plurality of corrugations;



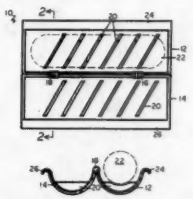
(c) at least one blade;
(d) means for connecting said cap and seat.

4,976,029

HOT DOG CUTTER APPARATUS AND METHOD

Thomas W. Kennedy, 575 Willow St., West Barnstable, Mass. 02668

Filed Jan. 12, 1990, Ser. No. 464,364
Int. Cl.[5] A47J 43/00
U.S. Cl. 30—114 6 Claims



1. A cutting apparatus for making partial cuts in tubular food products, such as hot dogs and sausages, which cutting apparatus comprises in combination:

(a) a holder comprising first and second generally symmetrical, longitudinal curved body sections having one and other sides for each section, the curved body sections each having a concave interior surface which sections together are adapted to hold and encompass a tubular-type food product between the sections to be cut;

(b) hinge means connecting the one sides of the first and second sections to permit the movement of the curved bodies of the cutting apparatus between an open, generally side-by-side curved body, receiving position and a closed cutting position;

(c) a lip-type extension edge on the other sides of the body sections extending generally outwardly a short distance from the said body sections to permit the first and second body sections to be pressed together into the closed position for the cutting of the food product; and

(d) cutting blade means including at least one cutting blade secured to the interior surfaces of one of the curved body sections and extending generally vertically inwardly for a short, predetermined cutting distance

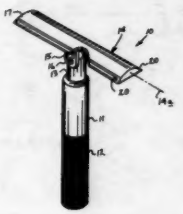
whereby on the insertion of the tubular food product within the cutting apparatus in the open position and thereafter closing the cutting apparatus to a closed position, the cutting blades make one or more partial cuts into the depth of the food product, and thereafter the cutting apparatus is placed in the open position and the partially cut food product retrieved.

4,976,030

HAIR TRIMMING APPARATUS

Alfred J. Boyd, 2 Bishops Road Upper Hale, Farnham, Surrey GU90JA, England

Filed Feb. 28, 1990, Ser. No. 486,291
Int. Cl.[5] B26B 19/00, 21/10, 21/86
U.S. Cl. 30—29.5 1 Claim



1. A hair trimming apparatus comprising,

an elongate, longitudinally aligned handle member defined by a handle member axis and defined by a first diameter, and

a support shank coaxially aligned with and integrally mounted to an upper terminal end of the handle member axis defined by a second diameter less than that of the first diameter,

and

a longitudinally aligned cutting head defined by a cutting head axis mounted to the support shank and pivotal about a pivot axis oriented transversely relative to the handle member axis,

and

wherein the cutting head is pivotal from a first position, wherein the cutting head axis is oriented orthogonally relative to the handle member axis to a second position wherein the cutting handle axis is arranged parallel to the handle member axis and spaced therefrom,

and

wherein the cutting head includes an arcuate top surface and a planar bottom surface, the planar bottom surface including a plurality of spaced legs, with a threaded fastener member directed through the spaced legs, and an upper end of the support shank to pivotally and transversely orient the fastener relative to the cutting head axis,

and

wherein the fastener includes an internally threaded wing nut mounted to the threaded fastener to clampingly secure the cutting head in the first and second positions selectively,

and

wherein the cutting head further including an abutment bar, the abutment bar defined by an abutment bar length, and the cutting head defined by a cutting head width, wherein the abutment bar length is greater than that defined by the cutting head width, and the abutment bar is contiguously mounted adjacent the bottom surface of the cutting head and includes a fastener directed through the abutment bar and received within a first threaded bore,

and

including a second threaded bore, the first and second threaded bores spaced diametrically opposed to one another relative to the support shank and spaced from the support shank a distance greater than one-half of the abutment bar length.

4,976,031

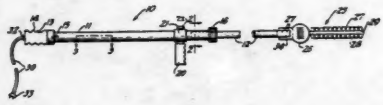
TELESCOPIC HEDGE TRIMMING APPARATUS

Ron Miller, 8 Eagle St., Spring Valley, N.Y. 10977

Filed Jun. 1, 1989, Ser. No. 360,076

Int. Cl.[5] B26B *27/00*

U.S. Cl. 30—296.1 **4 Claims**



1. A telescopic cutting apparatus comprising:

(a) an elongated outer tubular arm of not less than four feet in length;

(b) a first handle means coaxial with and closing off the lower end of said tubular arm;

(c) a biased electrical on/off switch means disposed within said handle means and being normally in the "off" position and requiring constant application of force to be translated into the "on" position. (d) a second handle means mounted proximate the upper end of said outer tubular arm;

(e) adjustment means for varying the positioning of said second handle means axially and radially with respect to said outer tubular arm;

(f) an inner tubular elongated arm telescopically mounted within said outer tubular arm;

(g) locking means associated with said inner and outer tubular arms to lock said inner arm in selected relation to each;

(h) trimming means having an electrical motor drive mounted on the upper end of said inner arm;

(i) a conductor cord extending from said motor internally through said arms in series with said switch means and outwardly of said first handle means and terminating in a plug;

(j) said conductor being a fixed expanded length equal to slightly more than the combined lengths of said inner and outer tubular arms;

(k) said conductor being permanently pre-coiled into a retractable spring portion having a contracted length not greater than that of said first tubular member;

(l) whereby said conductor cord is free of slack from its expanded length to its contracted length at all times and at all adjustments of said telescopic arms.

4,976,032

HAND IMPLEMENT FOR PICKING CITRUS FRUIT AND THE LIKE

Anthony D. Battaglia, Cincinnati, Ohio, assignor to Chiquita Brands, Inc., Cincinnati, Ohio

Filed Oct. 6, 1989, Ser. No. 418,134

Int. Cl.[5] B26B *27/00*; A01G *3/02*

U.S. Cl. 30—298 **7 Claims**

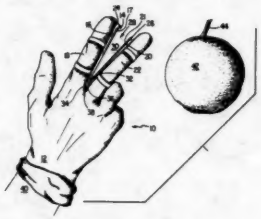
1. An implement for hand picking citrus fruit and the life, comprising

an elongated cutting member having an axially-elongated first, flexible blade with a flexible first cutting edge disposed axially along said first blade and an opposed, axially-elongated, second, flexible blade with an opposed flexible cutting edge disposed axially along said second blade,

said elongated cutting member defining a first, open outer end for passage of a citrus fruit stem between the cutting edges of said first flexible blade and said second flexible blade, and

said elongated cutting member defining a second, relatively more closed inner end, and

means for attachment of said axially elongated cutting member to a user's hand with said first, axially-elongated flexible blade along an index finger of the user's hand and said second, axially-elongated flexible blade along an adjacent, middle finger of the user's hand, the flexible cutting edges



of said first flexible blade and said opposed, second flexible blade adapted to act in concert for cutting said stem.

4,976,033

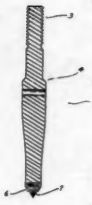
JEWELER'S HAMMER BIT

Meang Chia, and Larry Ta, both of 412 W. Sixth St., #1116, Los Angeles, Calif. 90014

Filed Oct. 27, 1989, Ser. No. 428,162

Int. Cl.[5] B26F *1/00*; B21K *21/00*

U.S. Cl. 30—366 **6 Claims**



1. A diamond-tipped bit for use with a jeweler's hammer, the bit comprising:

a shaft portion having a threaded portion formed on one end and a bore formed on the other end, said bore having a rear surface and an annular rim portion surrounding said bore; and

a diamond shaped to have a flat rear portion and to be slightly smaller in width than the diameter of said bore, said diamond having a length longer than depth of said bore, said annular rim portion clasping said diamond around an entire circumference into a firm stationary position within said bore.

4,976,034

DEVICE FOR REMOVING RINGS FROM FINGERS

Anthony T. Whitman, 5 Redgate Rd., Tyngsboro, Mass. 01879

Filed Jul. 11, 1989, Ser. No. 377,947

Int. Cl.[5] B27B *3/28*; B25F *3/00*; B26B *7/00*; B23D *45/16*

U.S. Cl. 30—370 **5 Claims**

1. A device for removing rings from fingers comprising:

(A) a handle assembly which includes

(1) a handle element having a longitudinal axis,

(2) a blade covering hood element mounted on one end of said handle element,

(3) a pivot means on said handle element adjacent to said hood element, and

(4) a motor mounted on said hood element and including a motor drive shaft which extends into said hood element;

(B) a lever assembly mounted on said handle assembly adjacent to said hood element and including

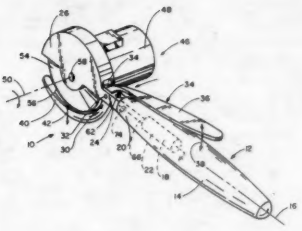
(1) a body connected to said pivot means to pivot toward and away from said handle element and having a body handle located adjacent to said handle assembly handle element, a base element located adjacent to said hood element, and a neck connecting said lever assembly handle to said base element and being pivotally connected to said pivot means so that said base element and said hood element move toward and away from each other when said lever assembly handle and said handle assembly handle element are moved toward and away from each other;

(C) a saw means located in said hood element and connected to said motor to be rotatably driven thereby about an axis of rotation for cutting a ring on a finger to separate that ring so it can be removed from the finger, said saw means including

(1) an extendable mounting means connected to said motor means to be driven thereby,

(2) two saw blade elements mounted on said extendable mounting means to be movable toward and away from each other to separate a ring after that ring has been cut by said saw blade elements,

(3) a first element on which a first saw blade of said two saw blades is fixedly mounted and which includes a bore and a keyway defined thereon to be adjacent to said bore, and



(4) a second element on which the second saw blade of said two say blades is fixedly mounted and which includes a first key on one end thereof which is received in said first element keyway to drivingly connect said first and second elements together, and a second key on another end thereof, said motor drive shaft having a bore defined therein and extending from one end thereof toward said motor said motor drive shaft including a keyway extending along said motor drive shaft bore, said extendable mounting means second element second key being received in said motor drive shaft keyway and drivingly connecting said second element to said motor drive shaft;

(D) rechargeable power supply means in said handle assembly handle element;

(E) switch means on said handle element;

(F) means connecting said motor to said power means via said switch means;

(G) switch activating means on said lever assembly for activating said switch means when said lever assembly handle and said handle assembly handle element are moved toward each other;

(H) charging means connectable to said power supply means to charge said power supply means; and

(I) a spring having one end thereof attached to said second saw blade and a second end thereof connected to said hood element and biasing said second saw blade away from motor and towards said first saw blade.

4,976,035

METHOD AND APPARATUS FOR CONTOURING DATA PARTICULARLY USEFUL IN PREPARING TOPOGRAPHIC MAPS

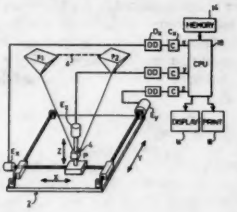
Nessim I. Levy, Savyon; Nira Dyn, Hod Hasharon, and Samuel Rippa, Ramat Chen, all of Israel, assignors to "XI" Information Processing Systems Ltd., Savyon, Israel

Filed Jun. 29, 1989, Ser. No. 373,139

Claims priority, application Israel, Jun. 30, 1988, 86936

Int. Cl.[5] G01B *3/14*

U.S. Cl. 33—1 A **10 Claims**



3. Apparatus for determining contour lines for gridded data defining a four-sided cell composed of two grid lines along the X-axis and two grid lines along the Y-axis, wherein there are two contour lines represented by four data points, one on each of the four grid lines, comprising:

means for sorting the four data points according to their values along a selected one of two grid axes;

means for connecting the point of minimum value along the selected grid axis to the point of second minimum value along the selected grid axis; and

means for connecting the point of third minimum value along the selected grid axis to the point of maximum value along the selected grid axis;

said apparatus being one for preparing a topographical map indicating elevation along the Z-axis at a plurality of sample points along the X-axis and Y-axis, said apparatus including means for inputting a common elevation value to be represented by said determined contour lines.

4,976,036

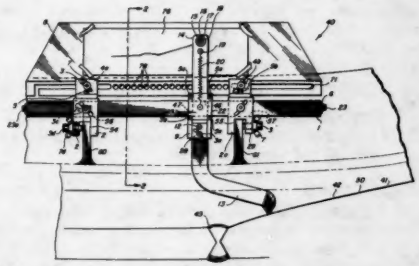
ASSEMBLY FOR DETECTING AND RECORDING SURFACE CONTOUR DATA

Glenn T. Yamanouchi, Aiea, and Stephen Orillo, Jr., Mililani Town, both of Hi., assignors to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed Oct. 31, 1989, Ser. No. 429,732

Int. Cl.[5] B43L *13/10*

U.S. Cl. 33—23.03 **6 Claims**



1. An assembly for detecting and recording contour data relating to a surface to be examined including a probe arm

having a first end in contact with the surface for scanning the surface to detect contour data, a slide block having a first slot therein running in a direction generally horizontal to the surface to be examined and a second slot running in a direction generally vertical to the surface to be examined, a scribe arm slidably mounted in the second slot, a first end of the scribe arm being connected to a second end of a probe arm so that vertical movement of the probe arm results in vertical movement of the scribe arm, a writing device mounted on the second end of the scribe arm, a slide bar arranged to receive the first slot of the slide block to permit relative sliding movement therebetween, at least one clamp block having an upper end on which the slide bar is mounted and a lower end for mounting the assembly in a location relative to the surface to permit scanning of the surface by the probe arm, and an image receiving board mounted on the clamp block and in contact with the writing device to receive and record contour data detected by the probe arm.

4,976,037

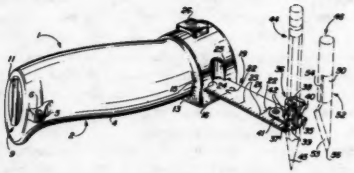
MARKING AND CUTTING DEVICE

Burl D. Hines, P.O. Box 560, Plain Dealing, La. 71064

Continuation-in-part of Ser. No. 170,849, Mar. 21, 1988, abandoned. This application Dec. 14, 1988, Ser. No. 284,404

Int. Cl.[5] B43L *9/04*

U.S. Cl. 33—27.03 **6 Claims**



1. A combination marking and cutting device for marking a workpiece, comprising a tape housing provided with a hollow tape housing interior; a fulcrum projecting from the bottom of said tape housing for rotating said handle and said tape housing about a vertical axis extending through said tape housing and said fulcrum; a spool rotatably mounted in said tape housing interior and a measuring tape wound on said spool, with one end of said measuring tape attached to said spool; a tape slot provided in said tape housing for receiving the opposite end of said measuring tape and unwinding said measuring tape from said spool; an elongated handle projecting from said tape housing in angular relationship away from said tape slot, said elongated handle having a projection on the free end thereof; a cavity provided in said elongated handle and removable closure means provided in said elongated handle for removably closing said cavity; and retaining means carried by said opposite end of said measuring tape outside of said tape housing, for receiving a pencil, whereby said measuring tape and said retaining means are extended from said tape slot to a selected length and said pencil and said handle are manipulated to mark the workpiece in a selected pattern.

4,976,038

SHOTGUN SIGHTING SYSTEM AND METHOD

Floyd C. Nattrass, RR1 Okotoks, Alberta, Canada T0L 1T0

Filed Aug. 7, 1989, Ser. No. 390,648

Int. Cl.[5] F41G *1/00*

U.S. Cl. 33—233 **19 Claims**

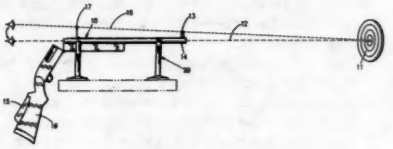
1. A sighting system for a shotgun useful for a user to align firing trajectory with a target, said sighting system comprising:

a facial contact support point;

a forward sight member for rigid fixation at a forward end of a shotgun barrel, said sight member comprising (i) a base with means for attachment to the barrel, (ii) a sighting bead with a bead face configured to face the user during firing, and (iii) an elevating blade interconnecting the sighting bead with the base and giving proper height and orientation to the bead face with respect to the shotgun barrel;

a rearward, transient sighting element having an alignment aperture enabling concurrent sighting alignment on a single target for (i) a first line-of-sight for the shotgun bore and (ii) an adjustable non-parallel second line-of-sight defined by a line connecting the bead of the forward sight member and the alignment aperture of the rearward sighting element with the target;

said aperture and bead face having relative dimensions which enable the user to view the bad face through and within the sighting aperture, with the target in background, to ensure proper alignment of the adjustable line of sight;



said rearward sighting element comprising a vertical track coupled to a base support, said support having means for attachment to a rearward section of the shotgun barrel, said sighting element including a tracking member slidably disposed along the track and including the sighting aperture configured for transient use during alignment procedures with respect to the adjustable line-of-sight; and

displacement means coupled to the rearward sighting element for enabling displacement or removal of the alignment aperture out of the second line of sight prior to firing of the shotgun, such that no rear sighting element is aligned on the second line of sight.

4,976,039

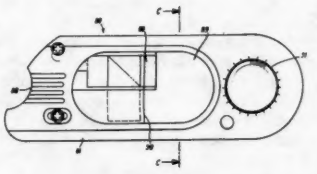
NAVIGATION AID

John D. McAllan, 187 Maxwellton Avenue, East Kilbride, Glasgow G74 3DX, and Douglas L. Young, 7 Ard Gare, Shandon, Nr. Helensburgh, Dunbartonshire, both of Scotland

Filed Aug. 30, 1988, Ser. No. 238,317

Int. Cl.[5] G01B *11/26*; G01C *1/00*

U.S. Cl. 33—285 **7 Claims**



1. A navigation aid for use in sailing vessels, the aid comprising a casing defined by at least one side wall, a first end wall and a second end wall spaced apart from said first end wall, the side wall having a first aperture and the end wall having a view port in the form of a second aperture, a reflective surface mounted on a movable mechanism, the mechanism comprising an elongate member having three pivotal connected sections, the sections being formed so as to provide a central section and two end sections, the central section of the member being formed so as to receive the reflective surface, one end of the member being affixed to the casing, near the first end wall of the casing and the opposite end of the member being affixed to

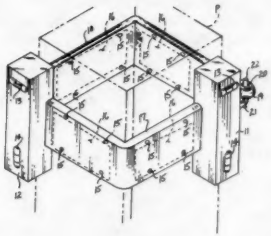
an arm, near the second end wall of the casing, such that movement of the arm pivots the sections with respect to each other and thus alters the angle of the central section with respect to the central axis of the casing, thereby enabling adjustment of the position of the reflective surface, such that and object located within a range of angles to the central axis of the casing can be viewed due to light from the object being transmitted by the first aperture and reflected by the reflective surface at an angle of reflectance which will direct the light through the view port, the angle of reflectance being alterable by the user altering the positioning of the reflective surface and thus altering the angle between the reflective surface and the central axis of the casing.

4,976,040

POST LEVEL APPARATUS

Joseph E. Mish, P.O. Box 116, Rock Springs, Wyo. 82902, and Enos Petersheim, 1804 Elk St. #210, Rock Springs, Wyo. 82901

Filed Feb. 28, 1990, Ser. No. 486,292
Int. Cl.[5] G01C *9/28*
U.S. Cl. 33—372 **8 Claims**



1. A post level apparatus comprising, in combination,
a first elongate longitudinally aligned level body, and
a second elongate longitudinally aligned level body, each level body including a horizontal and vertical spirit level mounted within a respective elongate recess within each level body, each respective horizontal and vertical spirit level mounted to each level body orthogonally oriented relative to each other, and
first band mounted integrally and orthogonally relative to a first side of the first level body at its first end and orthogonally and integrally mounted to a second side of the second level body at a second end of the band, and
a second band mounted to a first side of the second level body integrally and orthogonally thereto, and
the second end of the second band defining a free end for securement about an associated post, and
wherein the first band and the second band are elastic, and
wherein the free end of the second band includes a loop defining a vertical bore directed therethrough, the vertical bore oriented generally parallel to a second side of the first level body, and an "L" shaped hook mounted to the second side of the first level body.

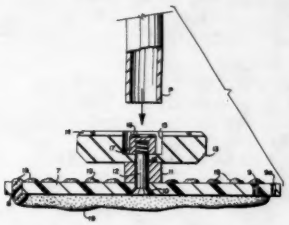
4,976,041

BASE-POINT ANCHOR

Gary T. Oshiro, 98-119 Kaulike Dr., Pearl City, Hi. 96782, and Rodney N. Morisato, 1326 Akahai St., Kailua, Hi. 96734

Filed May 24, 1988, Ser. No. 222,099
Int. Cl.[5] G01C *15/10*
U.S. Cl. 33—392 **6 Claims**

4. A base-point anchor, comprising:
a disk shaped body having a plurality of peripherally spaced adhesive locking apertures, a string hole, a tape rule slot and a threaded stem tube aperture;
a hollow cylindrical stem tube having an air vent threaded into said threaded stem tube aperture;
a first threaded retaining collar threaded onto said stem tube and abutting said disk shaped body;
a rotating tape lock having a string hole, a tape rule slot and a stem tube aperture rotatably mounted on said stem tube through said stem tube aperture and abutting said first threaded retaining collar;
a second threaded retaining collar threaded onto said stem tube and abutting said rotating tape lock, whereby said rotating tape lock is retained on said stem tube between said first threaded retaining collar and said second threaded retaining collar;
a stem tube cap having a plunger rod aperture attached to the end of said stem tube opposite the end attached to said disk shaped body;
a cylindrical plunger core having a slightly smaller diameter than the bore of said stem tube and also having annular



grooves along its periphery movably placed in the bore of said stem tube;
a plurality of flexible "O" rings seated in said annular grooves and forming an airtight seal between said plunger core and the bore of said stem tube;
a plunger rod attached to said plunger core and extending through said plunger rod aperture and outside said stem tube;
a spring mounted on said plunger rod abutting said plunger core, whereby said spring will bias said plunger core away from said stem tube cap as said plunger core abuts said stem tube cap;
a plunger handle having a plumb bob slot mounted on the end of said plunger rod opposite said plunger core; and
a bulk adhesive applied to the surface of said disk shaped body opposite said stem tube and extruded through said adhesive locking apertures onto the surface of said disk shaped body on which said stem tube is mounted.

4,976,042

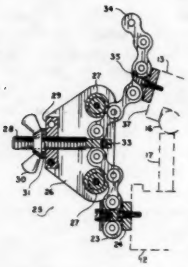
SINE PLATE ADJUSTABLE TENSION CLAMP

Robert Beatty, 133 Beatty St., Apollo, Pa. 15613

Filed Jun. 14, 1990, Ser. No. 537,782
Int. Cl.[5] G01B *3/30*
U.S. Cl. 33—536 **8 Claims**

1. An adjustable clamp including:
a hollow locking block having at least a portion open to the exterior;
an elongated flexible member having two ends and a middle portion, part of said middle portion disposed within said hollow locking block through said portion open to the exterior, one of said ends affixed to a first section of a device and the other said end removably attached to a second section of a said device;
a tension adjustment means comprising an elongated shaft mounted to and disposed through said hollow locking block and connected to said part of said middle portion of

said elongated flexible member, said elongated shaft axially movable in relation to said hollow locking block to



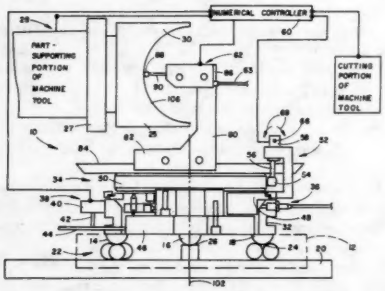
therefore adjust the tension on said elongated flexible member.

4,976,043

PRECISION CONTOUR GAGE

Lothar F. Bieg, Louisville, Colo., assignor to The United States of America as represented by the United States Department of Energy, Washington, D.C.

Filed Feb. 9, 1989, Ser. No. 308,336
Int. Cl.[5] G01B *5/20*
U.S. Cl. 33—551 **11 Claims**



10. An apparatus for measuring the contour of a machined part, comprising:

a rotary slide assembly including driven member, a shaft member extending upward from said driven member, a rotating platform portion supported by said shaft member, and a rail portion supported by said rotating platform portion,

means for supporting said rotary slide assembly including an air bearing assembly which directly supports said platform portion,

a housing for supporting said support means,

a kinematic mount supporting said support means, said kinematic mount comprised of a fixed mounting portion and at least one movable mounting portion, whereby the contour gage apparatus is moved into and out of measuring position with respect to the part by sliding of the apparatus on said movable mounting portion and by rotation of the gage apparatus around said fixed mounting portion

a linear probe assembly comprised of a suspension arm and a tip assembly including a probe tip for contacting the part, said suspension arm supported by said rotary slide assembly and including a slider portion which is capable of sliding upon said rail portion, whereby said linear probe assembly is capable of being positioned with respect to said rotary slide assembly, wherein said rotary slide assembly includes a variable diameter rotating portion,

means for driving said driven member, whereby said rotary slide assembly is rotated and the relative positions between the part and said probe tip are changed,

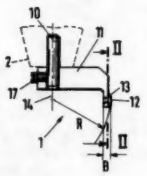
means for recording data representing linear positions of said probe tip at prescribed intervals in the change in positions between the part and said probe tip, said data recording means including a digital encoder capable of digitizing the degree of rotation of said rotary assembly, wherein one increment of said digital encoder is calibrated to correspond to one arc second of rotation of said rotary slide assembly, said digital encoder including means for adjustably supporting a barrel that contacts a said variable diameter rotating portion of said rotary slide assembly, whereby calibration of digital encoding with respect to rotation of said rotary slide assembly is brought about by adjusting said barrel with respect to said variable diameter rotating position.

4,976,044

SCANNER HEAD FOR A TOOTH-FLANK SCANNING DEVICE

Manfred Erhardt, Puchheim, and Herbert Loos, Dorfen-Stadt, both of Fed. Rep. of Germany, assignors to Carl Hurth Maschinen- und Zahnradfabrik GmbH & Co., Munich, Fed. Rep. of Germany

Filed Feb. 12, 1988, Ser. No. 155,355
Claims priority, application Fed. Rep. of Germany, Feb. 20, 1987, 3705537
Int. Cl.[5] G01B *5/16*
U.S. Cl. 33—501.14 **6 Claims**



1. In a scanner head for a tooth-flank scanning device for testing and measuring of gearlike tools which have abrasive tooth flanks, said scanner head having tooth engaging means thereon adapted to be introduced into a tooth space of the respective gear and which is further adapted to be guided along one of the tooth flanks bordering the tooth space, the improvement wherein said tooth engaging means is defined by a spherical segment having means defining a tooth flank engaging spherical surface, the radius of which tooth engaging spherical surface being substantially larger than the radius of a ball introducible into the tooth space, said tooth engaging means including a holder adapted to be secured to the tooth-flank scanning device, said holder being pivotal about an axis extending through a centerpoint of said spherical surface on said spherical segment and perpendicularly to the direction of movement of said scanner head relative to the tooth flank to be scanned.

4,976,045

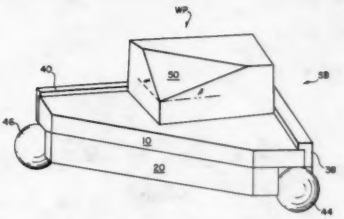
SINE BAR FOR COMPOUND ANGLES

Richard A. Schley, 627 Trumbull Ave., Warren, Ohio 44484

Filed Jan. 8, 1990, Ser. No. 461,812
Int. Cl.[5] G01B *3/50*
U.S. Cl. 33—537 **9 Claims**

1. A compound angle sine bar comprising a base frame, said base frame being affixed to a flat upper plate which is precision ground to be flat,

said base frame defining means for precisely locating three corner precision ground spheres with respect thereto wherein lines extending between their respective centers define a right triangle, and,



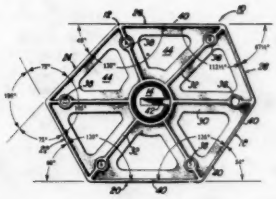
wherein said upper plate, said frame, and a flat surface upon which said sine bar is placed each have surfaces tangent to each said sphere.

4,976,046

MACHINE SETTING GAUGE

Leonard G. Lee, Ottawa, and Francis A. McLean, Ontario, both of Canada, assignors to Lee Valley Tools Ltd., Ottawa, Canada

Filed Apr. 10, 1989, Ser. No. 335,706
Int. Cl.[5] B27G *23/00*
U.S. Cl. 33—640 **7 Claims**



1. A machine setting gauge comprising six reference surfaces joined end to end, the first and second of which are oriented at 126° with respect to each other, the second and third of which are oriented at 120° with respect to each other, the third and fourth of which are oriented at 105° with respect to each other, the fourth and fifth of which are oriented at 135° with respect to each other, the fifth and sixth of which are oriented at 112½° with respect to each other and the first and sixth of which intersect each other.

4,976,047

APPARATUS AND METHOD FOR MEASURING THE LENGTH OF ELASTOMERIC ARTICLES

F. Merrill Galloway; Donald W. Campbell, and Tommie H. Runion, all of Bellefontaine, Ohio, assignors to H.B.D. Industries, Inc., Bellefontaine, Ohio

Filed Aug. 22, 1989, Ser. No. 397,013
Int. Cl.[5] G01B *3/12, 5/04*
U.S. Cl. 33—735 **3 Claims**

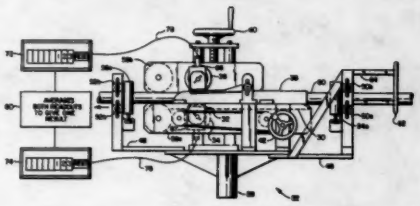
1. An apparatus for measuring the length of an elongated elastomeric article such as rubber hose or the like, comprising:

a slide table;

side fences mounted over the slide table for the elastomeric article to pass between, the side fences are simultaneously adjustable in a horizontal manner over a continuous range;

a first measuring wheel contacting a surface of the elastomeric article as it moves across the slide table;

a readout device connected to the first measuring wheel for indicating the length of the elastomeric article; and



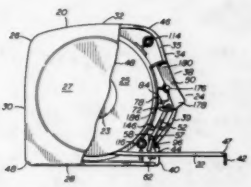
means for controlling the degree of arc of the elastomeric article as it moves across the measuring wheel.

4,976,048

TAPE MEASURE LOCK

William C. Blackman, Raleigh, N.C., assignor to Cooper Industries, Inc., Houston, Tex.

Filed Jun. 28, 1988, Ser. No. 212,558
Int. Cl.[5] G01B *3/10*
U.S. Cl. 33—767 **15 Claims**



1. A tape measure, comprising;

a case for retractably mounting a tape;

a toggle having opposed toggle pins for pivotal engagement within said case and at least one slotted arm projecting from one end of said toggle;

a shoe rotatably disposed on said slotted arm, said shoe having engagement tangs for engaging said tape and first and second pairs of opposed pins projecting from said shoe;

said case having a tape slot for extending said tape, pivot recessed receiving said opposed toggle pins, opposed arcuate guides adjacent said toggle, and vertical guides adjacent said tape slot;

opposed engagement arms protruding from the inner sides of the case; and

said first pair of opposed pins sliding within said arcuate guides and said second pair of opposed pins sliding within said vertical guides whereby said guides guide said shoe into engagement with said tape to clamp said tape between said engagement tangs and engagement arms in response to actuation of said toggle about said toggle pins.

4,976,049

SCRUBBING SHOWER SANDAL

Ronald K. Myers, 440 N. State Line Rd., Sharon, Pa. 16146

Filed Oct. 11, 1989, Ser. No. 419,902
Int. Cl.[5] A43B *5/08, 3/12*
U.S. Cl. 36—8.1 **9 Claims**

1. Scrubbing shower sandals comprising, a pair of foot supporting base members, a strap connected to each base member for removably holding each base member on a respective foot of a person, and a scrubbing surface mounted on the upper surface of each strap, said scrubbing surface comprising a

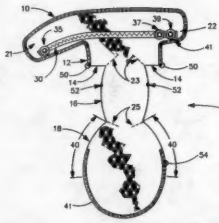
plurality of spirally wound bristles secured to a wire core, said strap performing the dual function of holding the sandal on the foot of the person and as a support for the scrubbing surface,

whereby the person can scrub the bottom of his feet by slipping a sandal off one foot, and moving the bottom of the foot back and forth across the top of the scrubbing surface on the strap of the sandal being worn on the other foot.

4,976,050
BABY BOOTIE

Barbara Houghteling, P.O. Box 658, Tabernash, Colo. 80478

Continuation of Ser. No. 34,608, Apr. 6, 1987, abandoned. This application Sep. 14, 1988, Ser. No. 244,150
Int. Cl.[5] A43B *1/02, 3/16, 3/10*
U.S. Cl. 36—9 R **52 Claims**



11. A bootie to be worn on a foot comprising:

a body of material that may be folded and sewn such that a pocket is substantially permanently formed to accept and completely cover a foot, a tongue is formed to cover the upper portion of the foot or the instep of the foot, and an ankle portion is formed to wrap about the wearer's ankle; and

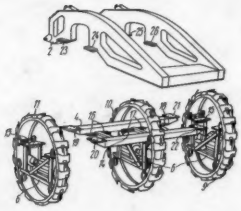
means for tightening the bootie about the wearer's foot consisting of means connected to said ankle portion for tightening said ankle portion around the wearer's ankle.

4,976,051
ROTARY TRENCH EXCAVATOR

Evgeny P. Kovalev; Alexandr M. Sushkin; June V. Trubakov; Vladimir N. Shpektorov, and Iosif N. Shpektorov, all of Moscow, U.S.S.R., assignors to Spetsialnoe Konstruktorskoe Buro "Gazstroimashina", Moscow, U.S.S.R.

PCT No. PCT/SU87/00115, § 371 Date Jun. 15, 1989, § 102(e) Date Jun. 15, 1989, PCT Pub. No. WO89/03915, PCT Pub. Date May 5, 1989
PCT Filed Oct. 19, 1987, Ser. No. 372,374
Int. Cl.[5] E02F *5/08*
U.S. Cl. 37—94 **3 Claims**

1. A rotary trench excavator comprising a prime mover **(1)** pivotably connected to a movable frame **(2)** carrying a working member, said working member comprising an additional frame **(4)** connected to said movable frame **(2)**; a plurality of support frames **(6)** each having guides **(8)** and support rollers **(7)** mounted thereon; each said support frame **(6)** independently detachably secured to said additional frame, a rotor rotatably mounted on the support rollers **(7)** and guided by the guide rollers **(8)** of each said support frame **(6)**, a drive means mounted on each support frame **(6)** for driving each said rotor, each said support frame having means for securing said support

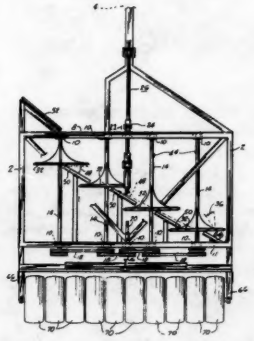


frame to said additional frame to permit a first and a second rotational direction of its associated rotor, said first and second rotational direction being rotational opposites from each other; and a wheeled support **(3)** carried by said movable frame **(2)** behind said plurality of support frames **(6)** and their associated rotors.

4,976,052
TOWED, POWERED, LAND GRADER

George C. Jeane, P.O. Box 23, Evans, La. 70639

Filed Sep. 12, 1989, Ser. No. 406,722
Int. Cl.[5] E02F *3/78*
U.S. Cl. 37—109 **7 Claims**



1. An apparatus for leveling an unprepared soil surface comprising:

first rotary cutter means;

said rotary cutter means rotating transverse to a direction of travel along a soil surface to be prepared;

at least a second rotary cutter means rotating transverse to a direction of travel, and offset laterally from said first rotary cutter means, being further offset along said direction of travel from said first rotary cutter means; and

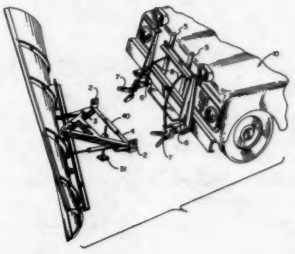
means intermediate said first and second rotary cutters for directing the flow of spoil from said first rotary cutter means into said second rotary cutter means.

4,976,053

AUXILIARY EQUIPMENT ATTACHMENT ADAPTER

Jeffrey H. Caley, P.O. Box 1054, Exeter, N.H. 03833

Filed Sep. 7, 1989, Ser. No. 404,268
Int. Cl.[5] E01H 5/06
U.S. Cl. 37—231 3 Claims



1. An adapter effecting ready horizontal and vertical alignment and attachment of various auxiliary pieces of equipment to a vehicle, said equipment having a vertical plate extending rearwardly for attaching to a vehicle, said vehicle having a coupling mating with said vertical plate and attaching thereto by a means of a horizontal pin through said vertical plate, said coupling consisting to two forward projecting spaced apart arms, and said adapter in service being interposed between said vertical plate and said coupling and interconnecting the two, said adapter comprising:

a. a horizontal cross bar affixed to said plate;

b. two vertical side walls diverging towards said plate to an opening at the front thereof of at least four inches and closing at the other end to a vertical slot receiving said vertical plate, the inner of the said two vertical side walls (i) being upwardly inclinded from front to back at least two inches, the slope thereof being no greater than 1:1 and (ii) ending in a horizontal slot mating with said horizontal cross bar;

c. a latch mounted on said inner vertical side wall contiguous to said horizontal slot and adapted to engage and hold said horizontal cross bar in said horizontal slot, and

d. mounting means holding said vertical side walls and facing rearwardly at the back of said vertical slot, rigidly mating with said coupling and adapted to be removably attached thereto, said mounting means comprising a horizontal I-beam the top and bottom plates of which extend over and firmly engage said spread apart arms and the web of which is pinned by a horizontal pin through said arms and web.

4,976,054

SNOWPLOW LEVELING SYSTEM

Daniel K. Jones, 5337 Reiner Rd., Madison, Wis. 53704

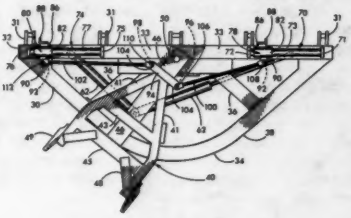
Filed Oct. 2, 1989, Ser. No. 415,986
Int. Cl.[5] E01H 5/04
U.S. Cl. 37—235 48 Claims

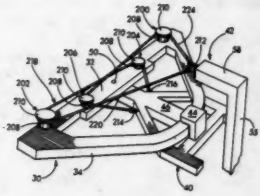
1. A plow blade leveling system comprising:

(a) a plow blade support frame and a lift arm adapted to be attached to a motor vehicle, the lift arm including means to slidably receive a lifting chain;

(b) a reversing tray including a front support bar having a first end, a second end, a top surface, a bottom surface and a forward side, the reversing tray being mounted on the support frame, the reversing tray being further adapted to receiver a plow blade or a brush thereon;

(c) means for adjusting the angle of the reversing table with respect to the plow blade support frame, said means for adjusting having a first end connected to the reversing tray and a second end connected to the support frame; and





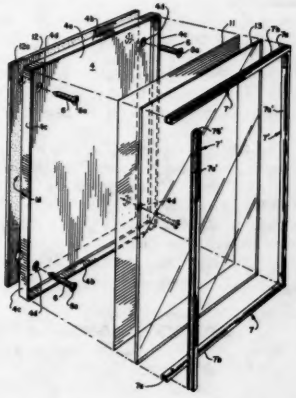
(d) a leveling device slidably connecting the support frame to the reversing tray in order to maintain the reversing tray in a position level to the ground.

4,976,055

WALL MOUNTED FRAME FOR POSTERS AND OTHER PRINTED MATERIAL

Michael Kane, River Forest, Ill., assignor to Kane Graphical Corporation, Chicago, Ill.

Filed Nov. 27, 1987, Ser. No. 125,944
Int. Cl.[5] A47G 1/06; G09F 1/12
U.S. Cl. 40—152.1 10 Claims



1. A wall mountable frame comprising: a rectangular pan-shaped frame including a main rectangular vertical rear wall having forwardly extending magnet-attracting marginal walls defining a rectangular sign or poster receiving recess, screw head-receiving holes in said main vertical wall for receiving

the heads of wall mounting anchoring screws which will be fully recessed in said holes and anchor the frame to a frame mounting wall surface, the defining walls of said holes being formed by rearwardly projection portions of said main vertical wall; magnet bars insertable along the marginal walls of said frame where they are magnetically secured to said forwardly extending marginal walls, to retain the peripheral portion of a poster or sign or a glare-reducing panel inserted into said front recess and placed against said main vertical wall of said frame; and spacing means behind said frame for engaging said mounting wall surface and spacing said projecting portions therefrom; said spacing means being cushion-forming strips secured to the rear surface of said frame vertical rear wall and of a thickness to extend rearwardly behind the rear margin of said projections and to be compressed by the pressure of the screw heads on said frame vertical wall.

4,976,056

ADVERTISING OR PROMOTIONAL ITEM

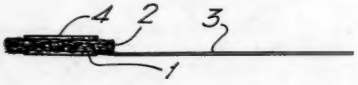
John L. Roberts, Hertfordshire, United Kingdom, assignor to Logobugs Limited, Hertfordshire, England

Continuation of Ser. No. 89,943, Aug. 26, 1987, abandoned, which is a continuation of Ser. No. 606,414, May 2, 1984, abandoned. This application May 11, 1989, Ser. No. 356,640

Claims priority, application United Kingdom, May 13, 1983, 8313275

Int. Cl.[5] G09F *3/10*

U.S. Cl. 40—299 **16 Claims**



1. An advertising or promotional item suitable for direct mailing comprising:

a first, substantially flat element having a top surface, a bottom surface, an adhesive disposed on said bottom surface, and a backing sheet releasibly adhered to said adhesive;

a body portion including a mass of non-woven fibers, said fibers being secured together and said mass being flattened so that the fibers are spread out and extend generally in a horizontal plane so that said body portion has a top surface and a bottom surface, said body portion being secured to said first flat element so that said bottom surface of said body portion is in opposed facing relation to said top surface of said first flat element so that said mass of fibers substantially covers the top surface of said first, flat element;

an elongated flag element having an advertising or promotional message marked thereon, said flag element being secured to said first, flat element and extending outwardly from a side edge thereof; and

a second, substantially flat element secured to the top surface of said body portion, said second, flat element maintaining said mass of fibers in said generally flattened disposition.

4,976,057

SIMULATED NEON SIGN

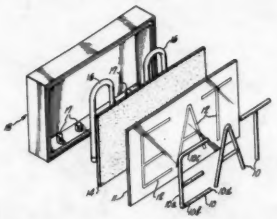
Dennis R. Bianchi, 4365 Woodglen Dr., Moorpark, Calif. 93021

Filed Jul. 21, 1988, Ser. No. 222,027

Int. Cl.[5] G09F *13/06*

U.S. Cl. 40—579 **9 Claims**

1. A display comprising tubing formed into a desired shape such as a letter, graphics or the like, said tubing comprising hollow tubing substantially in the form of an open 360° hollow cylinder having ends and an elongated side, and illumination means for lighting the tubing along the side thereof; and said tubing being adhesively bonded to a panel in the form of a sheet, said panel having a colored area thereon having a configuration co-extensive with the shape of the tubing, said illumination means being disposed on a side of said sheet to supply illumination to and through the colored area to the tubing.



4,976,058

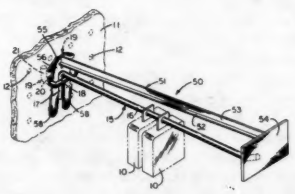
ARM-TYPE LABEL HOLDER FOR DISPLAY HANGERS

Stanley C. Valiulis, Rockford, Ill., assignor to Southern Imperial, Inc., Rockford, Ill.

Filed Jan. 9, 1980, Ser. No. 462,721

Int. Cl.[5] A47F *7/00*; G09F *1/00*

U.S. Cl. 40—657 **5 Claims**



1. A merchandising accessory for universal use with different types of display hangers each having a pair of laterally spaced and generally horizontally extending horns adapted to project through holes in a perforated display panel, said accessory comprising an elongated arm adapted to extend outwardly and generally horizontally from said panel, means on the outer end of said arm for displaying merchandise indicia, and a bracket on the inner end of said arm for attaching said arm to a hanger, said bracket comprising an upright plate, a pair of laterally spaced legs formed integrally with and extending downwardly from the lower end of said plate, said legs having opposing inboard edges and having oppositely facing outboard edges, a first set of notches formed in the outboard edges of said legs for receiving the horns of a hanger of a first type, and a second set of notches formed in the outboard edges of said plate above the notches of said first set for alternately receiving the horns of a hanger of a second and different type.

4,976,059

DEVICE FOR EXTRACTING CARTRIDGE CASES FROM THE CARTRIDGE CHAMBERS OF SO-CALLED SWING-BARREL SHOTGUNS

Alessandro Marzocco, Milan, Italy, assignor to Luigi Franchi S.p.A., Brescia, Italy

Filed Nov. 9, 1989, Ser. No. 433,920

Claims priority, application Italy, Nov. 18, 1988, 22671 A/88

Int. Cl.[5] F41A *15/06*

U.S. Cl. 42—46 **4 Claims**

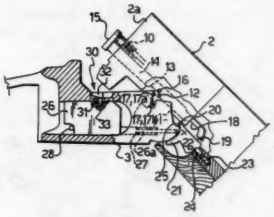
1. A mechanism for removing the cartridge case from the

cartridge chamber of the barrel pivotably mounted on the swing mount of a swing-barrel shotgun, comprising:

an extractor means for removing the cartridge case from the cartridge chamber, said extractor means movable between a retracted position and an extracted position;

resilient members urging said extractor toward the extracted position;

a check means for retarding movement of said extractor means, said check means movable between an engaged position relative to said extractor means and a disengaged



position relative to said extractor means, said check means retarding movement of said extractor means when in said engaged position;

a rest means for moving said check means into said engaged position, said reset means including a body having a predetermined mass and a rod, said body being guided for movement along an interfering path with said check means and being driven along said path by the recoil force, occurring upon firing of the cartridge case; and

a disengaging means for moving said check means into said disengaged position.

4,976,060

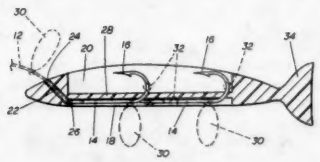
WEEDLESS FISH LURE

James I. Nienhuis, 701 Bering Dr. #1006, Houston, Tex. 77057

Filed Jun. 20, 1989, Ser. No. 369,025

Int. Cl.[5] A01K *85/00*

U.S. Cl. 43—42.41 **12 Claims**



1. An artificial weedless fish lure of the type for use with fishing hooks comprising:

a pliable body member having forward and rearward ends with a middle portion therebetween; and

said body member including first and second longitudinal alignment grooves on the middle portion of said body member, and a connecting means for attaching a fishing line to a hook,

said first groove desirably lies above a longitudinal axis in the pliable body member, and the second groove lies below the longitudinal axis and essentially aligned with the first groove,

said first groove is formed for receiving and concealing a shank portion of a fishing hook, and the second groove is formed for concealing an arcuate portion of the fishing hook;

whereby a fishing line can be attached to at least one hook, the hook, upon proper attachment to said body member by piercing a point portion of the hook vertically through the middle portion of the body member, is substantially concealed within the first and second grooves.

4,976,061

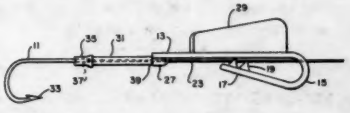
FISHING LURE

Richard b. Pool, 1343 Summit Rd., Lafayette, Calif. 94549

Filed Dec. 16, 1982, Ser. No. 450,357

Int. Cl.[5] A01K *83/00, 85/00*

U.S. Cl. 43—44.6 **3 Claims**



1. An improved fishing lure comprising

a spinner having a clamp for holding the head of a baitfish,

means for permitting the fishing line or leader to pass through said spinner including a guide at the rear of the spinner,

an angled plate secured to said clamp of said spinner at a position with respect to the means for the fishing line or leader to pass through the spinner which causes the spinner to rotate in the water as the lure is pulled through it, and

a pliable, semi-rigid, saltwater and temperature variation resistant spacer for supporting a fishhook at a predetermined distance from said spinner with the barb of said fishhook proximate the tail of a baitfish in the optimum extended position, said spacer being elongated with the rear end being formed to grip the eye end of the fishhook while surrounding the fishing line or leader tied to said fishhook eye such that the fishhook is maintained in the same longitudinal line as said spacer, the front end of said spacer being formed to bear against the spinner at the point where said guide for said fishing line is formed on said spinner, said spacer permitting the entire lure to rotate as a semi-rigid unit.

4,976,062

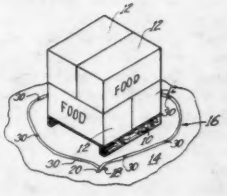
RODENT OR REPTILE REPELLING PRODUCT AND METHOD

Justin Rutledge, 3 Lakeside La., and Steven Rutledge, 509 Holden, both of Newport, Ark. 72112

Filed Jun. 2, 1988, Ser. No. 202,326

Int. Cl.[5] A01M *13/00*

U.S. Cl. 43—131 **5 Claims**



5. A method of protecting an area from animals comprising the steps of:

(a) providing an animal repelling product including an elongated, flexible, porous tube of a ropelike size, shape and flexibility;

a plurality of elongated bodies of granular repellant material disposed within said tube and spaced from each

other by short generally repellant material free gaps within said tube, the size of the granules in each body being sufficiently large that they cannot pass through said tube;

and barrier means in said gaps for preventing the entry of said repellant material into said gaps and allowing said tube to be severed in said gaps without spillage of repellant material from the tube;

(b) sizing said repelling product to extend about the periphery of the area to be protected by severing the same at one or more gaps to provide a section of said device having a length equal to or greater than said periphery; and

(c) locating the section resulting from step (b) in a closed loop about the periphery of the area to be protected.

4,976,063

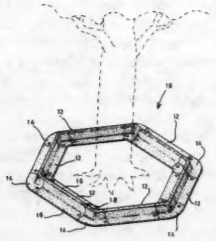
LAWN EDGING SYSTEM AND ASSOCIATED EDGING COMPONENTS

William J. Young, Rt. 10, Box 230, McMinnville, Tenn. 37110

Filed Jun. 9, 1989, Ser. No. 364,208

Int. Cl.[5] E01C *11/22*; A01G *1/00*

U.S. Cl. 47—33 **4 Claims**



1. A lawn edging component for being releasably joined with other said edging components to produce a barrier of a sufficient height above a surface of the ground to be suitable for holding within a perimeter formed by said component together with other of said components a quantity of mulching materials, for blocking the lateral growth of adjacent grass, weeds, and such like flora, and for being supported on the surface of the ground, said edging component comprising a body having first and second end portions, said second end portion of said body defining an indented section provided in said upper surface of said body for releasably receiving said first end portion of another said component, whereby said edging component and another said edging component are releasably joined, said body including:

an upright portion having a cross-section substantially defining an inverted U-shaped configuration, said upright portion extending substantially the length of said component, said upright portion defining first and second oppositely disposed sidewalls for forming a barrier to the passage of materials placed thereagainst and the lateral growth of weeds and grass, each said sidewall defining a lower portion;

a first flange carried by and extending outward from said lower portion of said first sidewall of said upright member, and extending substantially the length of said component, said first flange defining a lower planar surface for flush engagement with said ground surface for substantially preventing the lateral growth of grass and weeds; and

a second flange carried by and extending outward from said lower portion of said second sidewall of said upright member and extending substantially the length of said component, said second flange defining a lower planar surface for flush engagement with said ground surface for substantially preventing the lateral growth of grass and weeds.

4,976,064

EQUIPMENT AND METHODS FOR INJECTING AQUEOUS NUTRIENT SOLUTION IN HYDROPONIC CULTURE

Philippe Julien, 323, Avenue Molière, Brussels B-1060, Belgium

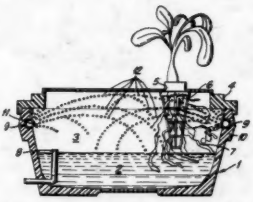
PCT No. PCT/BE88/00017, § 371 Date Feb. 27, 1989, § 102(e) Date Feb. 27, 1989, PCT Pub. No. WO88/09116, PCT Pub. Date Dec. 1, 1988

PCT Filed May 18, 1988, Ser. No. 343,177

Claims priority, application Belgium, May 18, 1987, 8700550

Int. Cl.[5] A01G *31/02*

U.S. Cl. 47—63 **2 Claims**



1. Hydroponic growing apparatus comprising: a tank adapted to contain an aqueous nutrient solution, a removable cover, an air space between the solution and the cover, plant holders located in openings in the cover, and means for circulating the solution through the apparatus, said means including a circulation pump, means for injecting the nutrient solution into the tank including pipes entirely located in the air space between the solution and the cover, held on lateral walls of the tank, and having injection orifices, regularly spaced along the pipes, for injecting the solution under pressure on opposite, substantially horizontal trajectories above the surface of the solution, and an overflow pipe for regulating the level of the solution within the tank and for removing excess solution to said external system, and resilient means for retaining the pipes to the lateral walls.

4,976,065

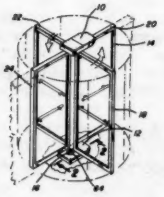
CONTROL APPARATUS FOR DOORS

Mark A. Beran, Niwot, and Allan J. Evans, Boulder, both of Colo., assignors to BC Research and Development, Inc., Niwot, Colo.

Filed Nov. 20, 1989, Ser. No. 438,854

Int. Cl.[5] E05D *15/02*

U.S. Cl. 49—43 **20 Claims**



1. A control apparatus for controlling rate of rotation of a shaft connected with a door to thus control rate of motion of the door, the shaft having an end through which its axis of rotation is defined, said apparatus comprising:

a restraining member positioned around and spaced from the shaft;

first and second rotation limiting means each having a first end portion pivotably connected with the shaft and a second end portion so that when the shaft rotates said rotation limiting means revolve around the shaft adjacent to said restraining member, said rotation limiting means each having a contact surface for contacting said restraining member when a selected rate of rotation of the shaft is exceeded to thus encumber free rotation of the shaft;

a single biasing means connected between said second end portions of said first and second rotation limiting means and having a portion extending adjacent to the end of the shaft through the defined axis of rotation, said biasing means for biasing said contact surfaces away from said restraining member; and

converting means connected between the shaft and the door for causing rotation of the shaft at a preselected relative rate of rotation, said relative rate of rotation being related to the rate of motion imparted to the door under the control of a user of the door by a selected ratio, and for responding to encumbrance of the rate of rotation of the shaft cause by contact between said contact surface of said rotation limiting means and said restraining member to control the rate of motion of the door and thus inhibit motion thereof in excess of a selected desirable rate.

4,976,066

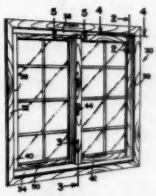
SLIDING WINDOW APPARATUS AND METHOD

David D. Plummer, Hudson, Wis., and Hartmut Glnnow-Merkert, Oroso, Minn., assignors to Andersen Corporation, Bayport, Minn.

Filed May 15, 1989, Ser. No. 351,779

Int. Cl.[5] E05D *15/10*

U.S. Cl. 49—225 **14 Claims**



1. A window construction of the type having at least one movable window sash, comprising:

(a) a frame having a sill;

(b) at least one sash mounted for sliding movement in said frame;

(c) a first guide track on said frame for slidably supporting said sash and for directing movement of the bottom of said sash along said frame, said first guide track projecting above said sill and longitudinally extending therealong;

(d) a second guide track on said frame in generally opposed relation to said first guide track for directing longitudinal movement of the top of said sash along said frame; and

(e) glide means pivotally mounted to said sash and cooperatively mounting said sash between said first and said second guide tracks for supportively moving said sash along and between said opposed tracks; said glide means being operable in a first position within a first movement zone of said frame to guide said sash for movement along said first and second guide tracks in a first plane, and being automatically rotatable toward a second position within a second movement zone of said frame when said sash approaches a closure position to transversely move the entire sash to a second plane parallel to said first plane in a manner such that the general plane of said sash remains substantially parallel to said first plane during said transverse motion.

4,976,067

SEALING STRIPS

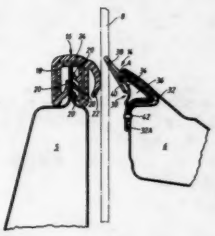
Klaus P. Maass, Viersen, Fed. Rep. of Germany, assignor to Draftex Industries Limited, Edinburgh, United Kingdom

Filed Jul. 27, 1989, Ser. No. 386,288

Claims priority, application United Kingdom, Aug. 1, 1988, 8818262

Int. Cl.[5] E05F *11/38*

U.S. Cl. 49—377 **11 Claims**



1. A sealing strip for mounting adjacent a slidable window pane, comprising:

means defining a longitudinally extending substantially air-tight hollow chamber having a wall portion which is relatively rigid and another wall portion which is relatively flexible,

a sealing lip running longitudinally along the length of the hollow chamber and being flexibly supported on the relatively rigid wall portion and mechanically connected to the relatively flexible wall portion, and

means for varying the air pressure within the hollow chamber so as to cause the relatively flexible wall portion to flex and thereby to cause the sealing lip to pivot on its flexible connection between a first position in which it sealingly engages the window glass and a second position in which it does not sealingly engage the window glass,

the hollow chamber being substantially triangular in cross-section with the relatively rigid wall portion comprising two of its sides and the relatively flexible wall portion defining its third side, the sealing lip extending away from and being flexibly mounted at the edge running longitudinally of the hollow chamber at a corner of its cross-section between the relatively rigid wall portion and the relatively flexible wall portion, and including a leg external to the hollow chamber and connecting an intermediate part of the flexible wall portion to the sealing lip,

whereby reduction of air pressure within the hollow chamber draws the flexible wall portion inwardly of the hollow chamber and exerts a pulling force on the sealing lip via the said leg so as to move the lip into the said first position, and increase of air pressure within the hollow chamber results in the flexible wall portion flexing outwardly of the hollow chamber and moving the sealing lip into the said second position.

4,976,068

REPOSITIONING DEVICE FOR A WEATHER SEAL

James F. Keys, West Bloomfield, Mich., assignor to The Standard Products Company, Cleveland, Ohio

Filed Oct. 19, 1989, Ser. No. 424,160

Int. Cl.[5] F24C *15/02*

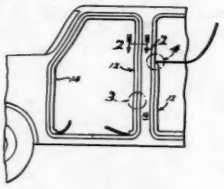
U.S. Cl. 49—482 **5 Claims**

1. A weather seal adapted to be secured on a flange of a vehicle to seal a gap between the flange and a panel member, comprising:

means for retaining said weather seal on the flange;

means for sealing the gap between the flange and the panel member;

said sealing means comprising a trim lip extending outwardly from said retaining means;



means for repositioning said sealing means to seal the gap when the sealing means is disposed in the gap; and

said repositioning means comprising a lip repositioning member detachably secured to said retaining means below said trim lip.

4,976,069

AUTOMOBILE DOOR SEAL, AND A MOLDING APPARATUS THEREOF

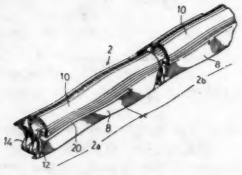
Hidetoshi Arima, Kyowamachi, and Satoyuki Hatayama, Aichi, both of Japan, assignors to Tokai Kogyo Kabushiki Kaisha, Oobu, Japan

Filed Oct. 31, 1989, Ser. No. 429,361

Claims priority, application Japan, Nov. 2, 1988, 63-278417; Apr. 7, 1989, 1-89450

Int. Cl.[5] E06B 7/16

U.S. Cl. 49—497 **4 Claims**



1. An automobile door seal, which consists of an anchor portion to be attached to the frame of the automobile body and a tubular seal portion integrally connected with said anchor portion and achieving sealing by elastic deformation, said seal being capable of being attached along the peripheral edge of a door opening of the automobile body, said seal having a first door-sealing portion having therealong an insertion groove extending in the direction of the length of said door seal and adjacent the integral connection of said anchor portion and said tubular seal portion and being for receiving the edge of a facing member on the interior of the automobile body, and said door seal having a second door-sealing portion which is ungrooved, said door sealing portions being integrally molded to each other for avoiding the presence of a joint between them.

4,976,070

ADJUSTABLE CAM

Anthony Palazzola, 6371 Oakhill Rd., Ortonville, Mich. 48462

Filed Sep. 12, 1989, Ser. No. 406,156

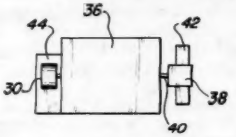
Int. Cl.[5] B24B 7/00

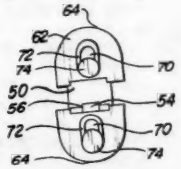
U.S. Cl. 51—101 R **4 Claims**

1. A grinding machine comprising; a grinding wheel; a guide member pivotally guided into and away from said grinding wheel; a part holder rotatably driven within said guide member; and a cam rotatably driven within said part holder;

rotation of said cam pivoting said guide member into and away from said grinding wheel;

said cam having, an elongate central holder portion having two ends and a shaft at a central position intermediate said two ends, there being at least one securing means, and at least one adjustable portion, each adjustable portion having an outer end facing away from said central position and an inner end facing toward said central position, there





being securing means upon said adjustable portion corresponding to said securing means said elongate central holder portion, said securing means allowing movement of said adjustable portions selectively towards and away from said central position to a desired position, said securing means securing said adjustable portion to said elongate central holder portion at said desired position, said desired position resulting in a cam having a desired length between said central portion and the outer end of said adjustable portion.

4,976,071

CLAMPING FIXTURE FOR AXIALLY CLAMPING A TOOL IN PLACE, IN PARTICULAR A DISC

Manfred Stübler, Leinfelden-Echterdingen, Fed. Rep. of Germany, assignor to Robert Bosch GmbH, Stuttgart, Fed. Rep. of Germany

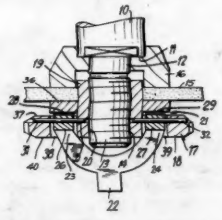
PCT No. PCT/DE87/00555, § 371 Date May 26, 1989, § 102(e) Date May 26, 1989, PCT Pub. No. WO88/04596, PCT Pub. Date Jun. 30, 1988

PCT Filed Nov. 28, 1987, Ser. No. 378,187

Claims priority, application Fed. Rep. of Germany, Dec. 17, 1986, 3643067

Int. Cl.[5] B24B 41/04

U.S. Cl. 51—168 **8 Claims**



1. A clamping device for axially clamping a tool, in particular, a disk tool on a flange of a rotatable spindle having an end-side threaded step, said clamping device comprising a clamping nut having an inner thread cooperating with the end-side threaded step of the spindle for securing the tool on the spindle; and a clamping member axially positioned between the tool and said nut, said clamping member being supported on said clamping nut for pivotal movement relative thereto about a substantially diametral axis and having pressure surface means for applying a clamping force to the tool, said pressure

surface means comprising at least one pressure surface arranged eccentrically relative to said substantially diametral axis,

an axially moveable pressure disk positioned between the tool and said clamping member, said clamping member comprising a clamping fork having two fork legs with fork leg ends, said two fork leg ends are pivotally mounted on said clamping nut about the diametral axis, each of said fork leg ends having an eccentric pressing surface which protrudes axially beyond a clamping nut end face and acts via said pressure disk upon the tool,

wherein said clamping nut is provided with a plurality of recesses, and said clamping fork with said fork legs is at least partially accommodated in said recesses in the clamping position.

4,976,072

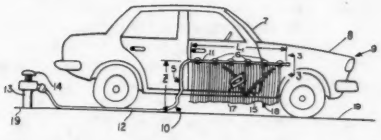
FLUID DIRECTING METHOD AND APPARATUS FOR AIDING THE SHAPING, POLISHING AND SMOOTHING OF WORK PIECE BY SANDING

Thomas W. Hicks, P.O. Box 9840, South Lake Tahoe, Calif. 95731

Filed Mar. 10, 1989, Ser. No. 321,888

Int. Cl.[5] B24B 55/00

U.S. Cl. 51—266 **15 Claims**



1. Fluid dispensing means for generating and applying a linear array of wetting fluid to the surface of a work piece to be sanded, comprising a flexible cylindrical hose segmented into a linear sourcing segment, a series of suction cups directly and independently attached along said linear sourcing segment capable of non-marring pressure attachment to said work piece at a plurality of suction closure planes, a series of radial openings in said sourcing segment intermediate of said suction cups and positioned such that said sourcing segment is offset from said work piece by a distance d after said pressure attachment occurs so that a linear array of wetting fluid can be directed toward said plurality of suction closure planes to effectively aid wet sanding of said work piece without undue waste of said wetting fluid.

4,976,073

METHOD AND APPRATUS FOR MOVING A GRANULATE MATERIAL IN A DENTAL PRACTICE SITUATION

Rieger Klaus-Ulfert, Singen, Fed. Rep. of Germany, assignor to Renfert GmbH & Co., Singen, Fed. Rep. of Germany

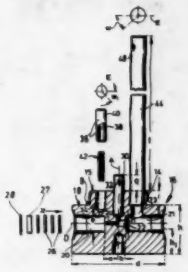
Filed Mar. 3, 1988, Ser. No. 163,810

Claims priority, application Fed. Rep. of Germany, Oct. 30, 1987, 3736972

Int. Cl.[5] B24C 3/00

U.S. Cl. 51—410 **44 Claims**

1. Apparatus for moving a granulate material for use on dental prosthesis items comprising a container having an interior portion for said material, a support base means connected to the container, duct means for carrying a flow of compressed working air in said support base means, at least one riser pipe fixed to the support base means and projecting into the container to a level above the level of material which in use of the apparatus is contained in the container for venting the interior of said container, means connecting the riser pipe to said duct means, at least one metering nozzle which terminates in the interior of the container and which is connected to said duct means, said metering nozzle extending into the container and having an inlet in the interior thereof for receiving said granulate material, including a recess means extending in substantially right angle relationship to said duct means for accommodating said metering nozzle, thereby to carry a flow of said



material from said container into said duct means, and further comprising at least one swirl nozzle with an axial passage therein having at least one opening to the interior of said container associated with said metering nozzle, connected to said duct means, and terminating in the interior of the container for feeding air to the granulate material in the container.

4,976,074

INFLATABLE VAULT HAVING A MULTILOBED DOUBLE WALL

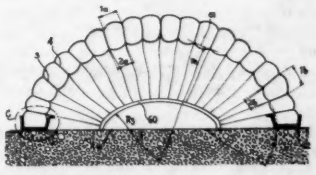
Guy R. Delamare, Le Pecq, France, assignor to Technip Geoproduction, Paris La Defense, France

Filed Sep. 29, 1988, Ser. No. 251,088

Claims priority, application France, Oct. 15, 1987, 87 14259

Int. Cl.[5] E04B 1/34

U.S. Cl. 52—2 J **30 Claims**



1. An inflatable vault comprising:

a plurality of contiguous individually inflatable leaktight hollow beams, each hollow beam including

at least two longitudinal elongated panels connected together along neighboring longitudinal edges thereof in a sequential manner, and

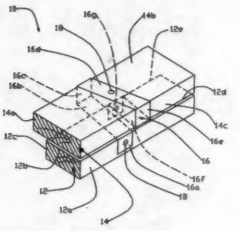
a longitudinally elongated flexible membrane connected in a leaktight manner between each pair of said neighboring edges of said panels; and

quick-connect means for mutually connecting the longitudinal edges of each respective pair of neighboring longitudinal edges of said panels and for connecting each said pair of neighboring edges to a corresponding pair of neighboring edges of panels of an adjacent one of said plurality of leaktight hollow beams.

4,976,075
ROOF HINGE ARRANGEMENT AND METHOD OF USING SAME FOR MODULAR HOUSING

Joseph E. Kaveckis, 1365 York Avenue, Box 120, New York, N.Y. 10021, and S. Roy Pertchik, 429 East 9th Street, Apt. 1, New York, N.Y. 10009

Filed Feb. 10, 1989, Ser. No. 309,616
Int. Cl.[5] E04B *1/344*
U.S. Cl. 52—71 33 Claims



1. An arrangement for pivotally securing a panel to a housing wall member, said arrangement comprising:

elongated plate leaf means connected to an upper end of the housing wall member for attaching the panel to the housing wall member;

elongated rocker leaf means secured to said panel for mounting said panel on said plate leaf means; and

flexible hinge band means, wrapped at least partly about said plate leaf means and at least partly about said rocker leaf means, for coupling together said plate leaf means and said rocker leaf means together;

said flexible hinge band means including a first hinge band portion secured to both said plate leaf means and said rocker leaf means and being flexible relative to both said plate leaf means and rocker leaf means to define with said plate leaf means and rocker leaf means two different pivot axes about which said plate leaf means and rocker leaf means are pivotable relative to each other, which pivot axes are displaced from each other in a direction transverse to the longitudinal direction of said elongated rocker leaf means and plate leaf means, and said first hinge band portion being secured to both said plate leaf means and rocker leaf means to prevent lateral or sidewise relative movement thereof in at least a first transverse direction; and

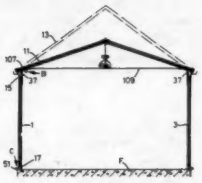
said flexible hinge band means further including a second hinge band portion secured to both said plate leaf means and said rocker leaf means and being flexible relative to both said plate leaf means and rocker leaf means and cooperating with said first hinge band portion to permit said plate leaf means and rocker leaf means to pivot relative to each other about said two different pivot axes, and said second hinge band portion being secured to both said plate leaf means and rocker leaf means to prevent lateral or sidewise relative movement thereof in at least a second transverse direction which is in a direction substantially opposite to said first transverse direction;

whereby said flexible hinge band means permits said pivotal movement of said rocker leaf means on said plate leaf means on said two different pivot axes, and said flexible hinge band means also serves as a restraining means for substantially preventing said lateral or sidewise movement of said rocker leaf means relative to said plate leaf means in at least said first and second transverse directions.

4,976,076
BUILDING STRUCTURE

Ronald L. Brown, Bournefields, United Kingdom, assignor to Finch Conservatories Limited, Southampton, United Kingdom

Filed Aug. 10, 1989, Ser. No. 392,102
Claims priority, application United Kingdom, Aug. 10, 1988, 8819006
Int. Cl.[5] E04B *7/02*
U.S. Cl. 52—90 15 Claims



1. A building structure for providing a frame for a conservatory, comprising:

two spaced rows of at least substantially upright extruded frame members defining spaced side walls of the building;

at least one substantially horizontal beam joining upper ends of the upright frame members in at least one of said rows;

a plurality of extruded roof bars extending between the upper ends of the frame members of one row and opposed upper ends of the frame members of the other row;

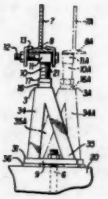
wherein at least selected ones of said upright extruded frame members and extruded roof bars comprise metal reinforcement means extending throughout their lengths; and

structural connecting means connected between said selected reinforced frame members and roof bars for providing a rigid connection at each joint, to form one or more Portal Frames in said structure.

4,976,077
FOUNDATION STANCHION FOR MOBILE HOME FOUNDATIONS APPARATUS AND METHOD

Joe W. Tucker, 205 Deer Trace Cove, Cedar Park, Tex. 78613

Filed Jan. 23, 1989, Ser. No. 299,603
Int. Cl.[5] E04H *9/14*
U.S. Cl. 52—126.6 22 Claims



1. A foundation stanchion apparatus which is secured at its lower end to a concrete member by tensional anchor means, and which supports and secures a segment of a structure at its upper end, said apparatus comprising:

(a) a horizontally disposed base means having means for receiving said tensional anchor means;

(b) an elongated, vertically disposed body means joined at its lower end to said base means; and joined at its upper end to

(c) a support and securement means which is operably engaged with a longitudinal support member of said structure;

(d) said tensional anchor means at each stanchion location is

positioned upon a line parallel to said structure's longitudinal support member;

(e) said anchor receiving means in said base means is located within said body means; and

(f) said stanchion is supported by said concrete member solely at points near the perimeter of said base means.

4,976,078

CABLE ANCHORING DEVICES

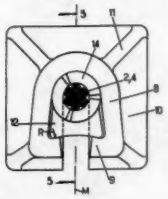
Pierre Jartoux, Epernon, France, assignor to Freyssinet International (STUP), France

Filed Apr. 20, 1989, Ser. No. 341,014

Claims priority, application France, Apr. 20, 1988, 88 05225

Int. Cl.[5] E04C 5/12

U.S. Cl. 52—223 L **4 Claims**



1. Device for the anchorage of a stretched cable (2, 4) of a general cylindrical contour on a bearing surface (1, D) through which this cable passes, said device having a truncated cone shaped housing for receiving a split truncated cone shaped jaw (14) adapted to surround and clamp a section of said cable, characterized in that said device comprises a U-shaped body (8) including two opposed arms, said body defining a U-shaped opening between said arms and being adapted to straddle said section, and said arms of said body being extended by flanges (9) directed towards one another, and a peg (12) adapted to be housed in the U-shaped opening of said body so as to bear between only said flanges of said arms and a portion of said jaw (14) facing said flanges, the assembly of body and peg being designed so as to define the truncated cone shaped housing.

4,976,079

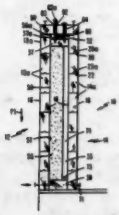
BUILDING STRUCTURE HAVING STACKED WOODEN BEAM WALLS

Said D. Liljegren, Route 631, Leon, Va. 22725

Filed Nov. 18, 1988, Ser. No. 273,374

Int. Cl.[5] E04B 1/10

U.S. Cl. 52—233 **31 Claims**



1. A building wall, comprising:

(a) a support sub-frame including a pair of generally vertical wooden supports having lower ends mounted to one of a sub-floor or a bottom plate in spaced apart substantially parallel relationship to each other and a top connecting chord extending between and connected to upper end portions of the vertical supports at a predetermined height above the sub-floor or top plate;

(b) a pair of facing channels respectively secured to the vertical supports to extend in substantially parallel relationship to each other in a generally vertical plane offset from the vertical plane defined below the top chord;

(c) a plurality of elongated wooden beam members of generally rectangular cross section extending between the channels in stacked relationship to another predetermined height with opposite ends of said beams received in said channel;

(d) a top plate connected to the uppermost stacked beam to define the upper end of the wall, the top plate having a face extending in a direction substantially perpendicular to the wall above the top chord in substantially parallel relationship thereto to define a space between an upper surface of the top chord and a lower surface of the top plate;

whereby said space enables settlement of said beams and top plate to occur relative to the sub-frame by sliding movement of the beam ends downwardly through the channels without said top plate settling into destructive contact with the top chord.

4,976,080

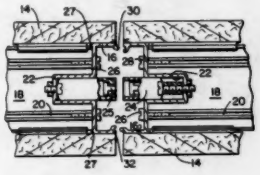
WALL SYSTEM AND METHOD OF CONSTRUCTION

Douglas R. Zegel, Morrestown, N.J.; Gary S. Jensen, Drexel Hill, Pa.; Mark R. Hernick, Prospect Park, Pa., and Michael J. Daniels, Doylestown, Pa., assignors to Art Guild, Inc., West Deptford, N.J.

Filed Dec. 16, 1988, Ser. No. 285,763

Int. Cl.[5] E04H 5/00

U.S. Cl. 52—239 **9 Claims**



1. A method of constructing a wall system:

(a) providing a plurality of wall frames including:

(i) a pair of spaced complementary vertical supports having means for lockingly engaging respective complementary vertical supports, and

(ii) an array of cross members spanning between and rigidly attached to said vertical supports;

(b) connecting said wall frames in series by lockingly engaging complementary vertical supports of respective wall frames together; and

(c) covering at least one side of said series of connected wall frames with a plurality of wall frame covering means having means for matingly engaging said frame cross member arrays by matingly engaging said wall frame covering means with said wall frames.

4,976,081

SANDWICH PANEL ASSEMBLY

Ernest N. Litzenberger, Boyertown, Pa., assignor to Bally Engineered Structures, Inc., Bally, Pa.

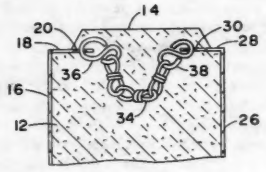
Filed Dec. 21, 1987, Ser. No. 135,394

Int. Cl.[5] E04B 1/78

U.S. Cl. 52—309.11 **11 Claims**

11. A sandwich panel assembly comprising a layer of thermal insulation disposed between two facings and a chain dis-

posed within the insulation layer and linked with both facings for positively connecting the facings together, the chain having a coating for restricting the transfer of heat through the chain.



4,976,082

NATURAL STONE PLATE HAVING HOLDING ELEMENTS PROVIDED ON THE SIDE FACING AWAY FROM THE VISIBLE SIDE

Martin Bard, Amberg, Fed. Rep. of Germany, assignor to Buchtal Gesellschaft mit Beschrankter Haftung, Schwarzenfeld, Fed. Rep. of Germany

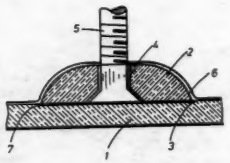
Filed Apr. 24, 1989, Ser. No. 342,485

Claims priority, application Fed. Rep. of Germany, May 6, 1988, 3815552

The portion of the term of this patent subsequent to Apr. 18, 2006, has been disclaimed.

Int. Cl.[5] E04F *13/08*

U.S. Cl. 52—384 20 Claims



1. A natural stone plate having holding elements provided on a side facing away from a visible side thereof, characterized in that the holding elements are attached to the stone plate by means of a glass solder whose coefficient of thermal expansion is approximately equal to that of the stone plate, and in that the holding elements are disposed on the plate at points of attachment determined according to static requirements.

4,976,083

PANELS WITH LAMINATED STRIPS FOR CLIPS

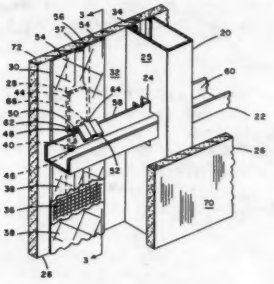
Robert J. Menchetti, Buffalo, N.Y., assignor to National Gypsum Company, Dallas, Tex.

Filed Jan. 23, 1989, Ser. No. 299,200

Int. Cl.[5] E04B *2/58*

U.S. Cl. 52—489 20 Claims

1. In combination, a wallboard having a thin, strong, tear-resistant material partially adhered essentially solely by an adhesive material to a back face of said wallboard, and a plurality of suspension clips, said tear-resistant material having a plurality of openings, said tear-resistant material being firmly adhered to said back face essentially solely by said adhesive material in areas closely adjacent said openings, said tear-resistant material being unadhered to said back face in areas located behind and immediately above said openings, said areas of unadhered material forming pockets, said suspension clips having at least one back leg extending vertically upwardly through one of said openings in said tear-resistant material and upward into one of said pockets between unadhered areas of said tear-resistant material and said back face, said suspension clip further having an outwardly and downwardly extending hanger leg for suspending said wallboard from a channel member of a wall framing structure.



4,976,084

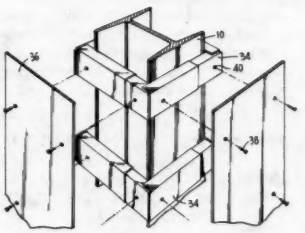
FURRING AND METHOD OF APPLING SAME

Clifford P. Verbiar, 6 Harrison Ave., Centereach, N.Y. 11720, and Richard Cote, 11 Adrienne Dr., Old Bethpage, N.Y. 11804

Filed Nov. 8, 1989, Ser. No. 433,168

Int. Cl.[5] E04B *1/38*

U.S. Cl. 52—713 21 Claims



1. A furring apparatus comprising:

a first generally U-shaped member having a first end, a second end, an inner face and a channel formed on its inner face;

a second generally U-shaped member having a first end, a second end, an inner face and a channel formed on its inner face;

means for engaging the first end of said first U-shaped member with the second end of said second U-shaped member;

means for engaging the first end of said first U-shaped member with the second end of first U-shaped member;

whereby said U-shaped members surround a column and the respective ends are engaged to form a ring which tightly encompasses the column; and

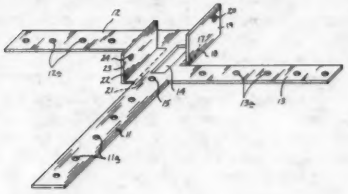
means for securing wallboard to said U-shaped members, said securing means comprising screws which pass through the wallboard and through outer surfaces of said U-shaped members and into the channels of said U-shaped members.

4,976,085

CONSTRUCTION PLATE

Robert E. Krueger, 3920 Tracewood La., Boynton Beach, Fla. 33436

Filed Feb. 28, 1990, Ser. No. 486,303
Int. Cl.[5] E04B *1/38*; E04C *5/00*; B25G *3/00*
U.S. Cl. 52—715 **7 Claims**



1. A construction plate for effecting joinder of a plurality of construction studs wherein the construction plate comprises,

a deformable rigid member, the member including an elongate longitudinally aligned central body leg, the central body leg including a central body leg right side edge and a central body leg left side edge and a central body leg rear end edge and a central body leg forward end edge, the central body leg integrally joined to a rear leg joined at a first intersection to the central body leg, the rear leg including a rear leg right side edge and a rear leg left side edge wherein rear leg right side edge and left side edge are parallel relative to one another and arranged orthogonally and integrally to the central body leg left side edge wherein the rear leg right side edge is coextensive with the central body leg end edge, and

a forward leg including a forward leg right side edge and a forward leg left side edge wherein the forward leg is integrally joined to the right side edge of the central body leg orthogonally and integrally thereto at a second intersection line, and

further including a right flange plate bendably joined to the central body leg right side edge coextensive therewith between the forward leg left side edge and the central body leg rear end edge, and

a left flange plate bendably joined to the left side edge of the central body plate between the rear leg left side edge extending forwardly thereof along the central body leg left side edge coextensive with the right side edge of the forward leg, and

wherein the central body leg includes a central slot directed therethrough wherein the central slot is formed through the central body leg extending from the first intersection line to the second intersection line of the rear leg and the forward leg.

4,976,086

METHOD AND DEVICE FOR BUILDING A GREENHOUSE

Petrus L. J. Bom, Maasland, Netherlands, assignor to P.L.J. Bom Beheer B.V., Netherlands

Filed Jun. 7, 1989, Ser. No. 362,669
Claims priority, application Netherlands, Jun. 7, 1988, 8801464; Oct. 11, 1988, 8802497; Belgium, Jan. 16, 1989, 8900039
Int. Cl.[5] E04G *21/14*
U.S. Cl. 52—741 **6 Claims**

1. Method for building a greenhouse, whereby a roof portion is glazed, said method comprising the following steps:

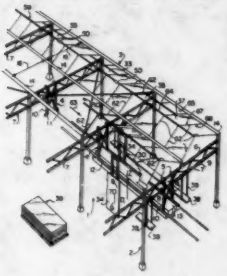
(a) suspending at least one frame from construction elements of said greenhouse;

(b) supporting lifting means by means of said frame;

(c) supporting at least one glass plate carrier by means of said lifting means at a low level;

(d) placing at least one glass plate on said glass plate carrier at the low level;

(e) raising said glass plate together with said glass plate carrier to a higher level by means of said lifting means;



(f) removing the glass plate from the glass plate carrier at the higher level and installing the glass plate at a predetermined position in the roof portion;

(g) returning the glass plate carrier to a low level; and

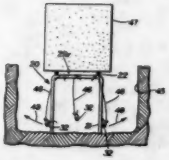
(i) repeating steps (d)–(g) for installing the glass plates in successive predetermined positions in the roof portion, whereby the lifting means is advanced along said successive predetermined positions.

4,976,087

METHOD OF FORMING FOOTING AND LAYING FIRST COURSE OF BLOCK

Edward Pizzino, P.O. Box 264, Hopedale, Ohio 43976

Filed Dec. 7, 1987, Ser. No. 129,460
Int. Cl.[5] E02D *27/00*
U.S. Cl. 52—742 **6 Claims**



1. Method of forming footing and laying first course of block to form a building foundation including the steps of:

(a) excavating an elongated trench in the ground at a desired location;

(b) providing a frame, said frame including a pair of spaced longitudinal stringers and a plurality of inverted U-shaped frame support members attached to and spaced along the stringers;

(c) inserting the U-shaped support members in the trench with said stringers extending in the direction of the excavated trench elongation;

(d) locating the stringers at a position below the ground level surrounding the trench;

(e) leveling the stringers;

(f) supporting reinforcing steel from the frame;

(g) placing a first course of a plurality of concrete blocks on the stringers in spaced relationship with each other and with block bottoms adjacent to the stringers;

(h) locating the center of each block in the course over one of the U-shaped support members; and

(i) pouring concrete in the excavation to fill the excavation to a level in which the frame, reinforcing steel and block bottoms are enclosed in the poured concrete.

4,976,088

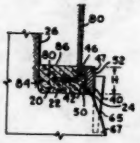
METHOD FOR CONSTRUCTION OF AN IN-GROUND SWIMMING POOL

John W. Powers, Rte. 3, Box 403A, Nevada, Mo. 64772

Filed Feb. 3, 1989, Ser. No. 306,478

Int. Cl.[5] E04B *1/00*; E04G *21/10*; E02D *17/00*

U.S. Cl. 52—742 **3 Claims**



1. An in-ground swimming pool construction method in an excavated hole with an associated perimeter shelf, an outboard wall, the perimeter shelf having an interior edge, which includes the steps of:

(a) constructing a footing form structure with a form member; an upper edge associated with said footing form structure;

(b) supporting said footing form structure on said shelf;

(c) adjusting said footing form structure such that said upper edge is generally level;

(d) pouring viscous concrete into a footing form volume defined by said form structure; the shelf, and the wall;

(e) creating an upper surface in said concrete poured into said footing form volume;

(f) leveling said upper surface of said concrete substantially flush with said upper edge of said footing form structure; and

(g) allowing said concrete to cure to provide a concrete footing.

4,976,089

PACKING APPARATUS WITH DEFECTIVE WRAPPER SHEET ELIMINATING MEANS AND METHOD

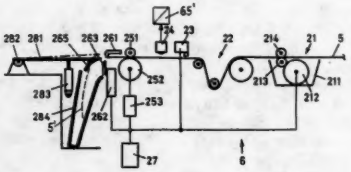
Wolfgang Reichelt, Gottmadingen, Fed. Rep. of Germany, assignor to Sig Schweitzerische Industrie-Gesellschaft, Neuhausen am Rheinfall, Switzerland

Filed Jan. 9, 1990, Ser. No. 469,773

Claims priority, application Switzerland, Jan. 13, 1989, 109/89

Int. Cl.[5] B65B *41/16*, *57/02*

U.S. Cl. 53—53 **11 Claims**



1. In a packing apparatus including

an input device having

advancing means for forwarding a wrapper sheet of indefinite length in a feeding direction along a conveying path;

processing means for performing an operation on the wrapper sheet;

a cutting device severing the wrapper sheet transversely to the feeding direction for consecutively forming wrapper sheet lengths; and

a bag-shaping device arranged downstream of said input device as viewed in the feeding direction, for receiving wrapper sheet lengths from said input device;

the improvement wherein said input device comprises

monitoring means for sensing said wrapper sheet and for generating a defect signal upon detecting a defect in the wrapper sheet and

deflecting means arranged downstream of said monitoring means and said cutting device for deflecting a defective wrapper sheet, in response to said defect signal, out of the conveying path into a waste position, thereby preventing the defective wrapper sheet from being introduced into the bag-shaping device.

4,976,090

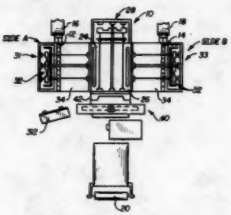
AUTOMATIC BOTTLE BAGGER

Bryan K. Porter, Jenison; Marvin J. Jakubiak, Kentwood, and Jerry A. Bott, Grand Rapids, all of Mich., assignors to Automatic Inspection Systems, Inc., Grand Rapids, Mich.

Continuation of Ser. No. 141,007, Jan. 5, 1988, abandoned. This application Mar. 14, 1990, Ser. No. 494,930

Int. Cl.[5] B65B *35/44*, *35/54*, *43/34*

U.S. Cl. 53—448 **40 Claims**



1. An apparatus for packaging articles, said apparatus comprising upstream and downstream portions, table means, conveyor means, and control means;

said table means being adapted to support said articles and comprising a center table and a pair of side tables on opposite sides of said center table;

said conveyer means being adapted to feed a group of said articles to each of said side tables at said upstream portion;

said pusher means being adapted to force said articles from said upstream portion to said downstream portion for subsequent packaging and comprising a center pusher at said center table, and a pair of side pushers at said side tables, said side pushers being positioned in opposing relationship and movable toward and away from each other, and said center pusher being positioned between said side pushers and movable between upstream and downstream positions in a direction normal to directional movement of said side pushers; and

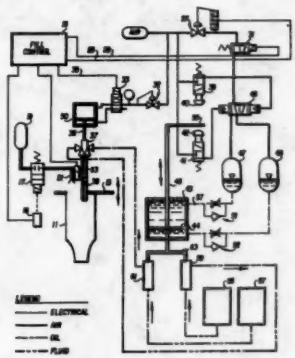
said control means being adapted to coordinate movement of said center pusher and said side pushers in a manner whereby a group of articles fed by said conveyor means to one of said side tables is moved by the respective side pusher to said center table and by said center pusher downstream for subsequent packaging alternately with a group of articles fed by said conveyor means to the other of said side tables.

4,976,091

METHOD AND APPARATUS FOR FILLING TUBES

Mark E. Salemka, and James W. Lorenzen, both of Adrian, Mich., assignors to Wacker Silicones Corporation, Adrian, Mich.

Filed Apr. 20, 1989, Ser. No. 341,086
Int. Cl.[5] B65B 1/48, 3/24, 3/30, 7/28
U.S. Cl. 53—467 13 Claims



1. A method for filling an open tube to a predetermined level below its open end with an admixture of two interacting compounds comprising

mounting an open tube substantially vertically, with the open end of the tube facing upwardly;

mixing a first and second compound adjacent said mouth of said tube;

partially filling said tube with the admixture of said compounds at a first fill rate;

reducing the fill rate of said admixture into said tube;

ultrasonically measuring the surface level of said admixture below the open end of said tube; and

terminating the flow of said admixture when the level within the tube reaches a predetermined level below the open end of said tube.

4,976,092

METHOD AND APPARATUS FOR TRANSPORTING SHEET METAL STAMPING

Lyle H. Shuert, 1034 Stratford Pl., Bloomfield Hills, Mich. 48013

Filed Jun. 19, 1989, Ser. No. 367,867
Int. Cl.[5] B65B 5/10; B62B 1/08
U.S. Cl. 53—475 18 Claims

1. A method of handling and transporting planar members comprising the steps of:

providing a rack structure;

positioning a plurality of leaves in serial relation along a surface of said rack structure with each leaf hinged at one edge thereof to said surface in generally parallel spaced relation to the hinge axes of the adjacent leaves and with each leaf pivotally movable between angularly spaced first and second positions;

positioning said rack structure proximate a source of said planar members;

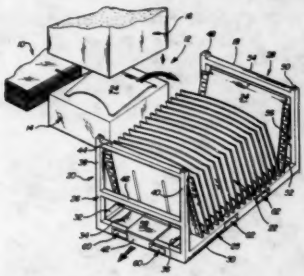
pivoting said leaves to their first positions;

pivoting one of said leaves to its second position;

placing a planar member adjacent said one leaf;.

pivoting the next adjacent leaf to its second position while providing a space between said one leaf and said adjacent leaf greater than the thickness of said planar member so as to protectively position said planar member between said one leaf and said adjacent leaf;

repeating steps E, F and G until a plurality of said planar members are positioned in sandwich, interspersed fashion between successive pairs of leaves; and



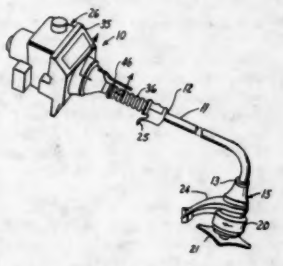
transporting said rack, with said planar members interspersed between said leaves, to a location remote from said source.

4,976,093

BRAKE SYSTEM FOR ROTARY CUTTERS AND TRIMMERS

Robert G. Everts, Chandler, Ariz., assignor to Inertia Dynamics Corporation, Chandler, Ariz.

Filed Aug. 25, 1989, Ser. No. 398,704
Int. Cl.[5] A01D 69/00
U.S. Cl. 56—11.3 6 Claims



1. A brake system for a vegetation cutter, said vegetation cutter having a boom with a proximal end and a distal end, power means mounted to the proximal end, a working head rotatably mounted to the boom at the distal end, a drive shaft in said boom drivingly connected to the working head, and a clutch interposed between said power means and said drive shaft, said cutter including a grip for being held by a hand of the user, said brake comprising:

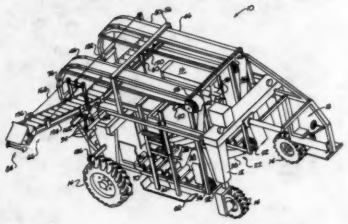
a brake surface concurrently driven with the shaft, a handle overhanging part of said grip, and brake means operatively connected to said handle adapted to be pressed against said brake surface to brake rotation of said drive shaft when applied, and to enable said rotation when not applied, respective to a handle position.

4,976,094

HARVESTING MACHINERY

Robert E. Williamson; Carl M. McHugh, and Clarence E. Hood, all of Clemson, S.C., assignors to Clemson University, Clemson, S.C.

Filed Jan. 29, 1988, Ser. No. 150,244
Int. Cl.[5] A01D *46/00*
U.S. Cl. 56—330 **14 Claims**



1. A mechanized harvester for harvesting fruit from fruit trees, comprising:

a mobile support frame adapted for being conveyed over the ground and along a row of fruit trees from which fruit is to be harvested;

fruit detachment means, carried on said support frame, for impacting such fruit trees while being conveyed therealong so as to detach fruit therefrom; and

conveyor means, comprising a conveyor loop entrained on said support frame over a path passing from a relatively low-lying collection area adjacent the ground to a relatively elevated discharge area thereabove, for collecting detached fruit on the inside of said conveyor loop in said collection area and for elevating such collected fruit to said discharge area, whereby collected fruit may be discharged from said harvester discharge area without interference wit the fruit tree from which the fruit is detached; wherein said fruit detachment means comprises

a central shaft mounted generally vertically on said mobile support frame and extending from an overhead position thereon downward towards said collection area;

impacting tines projecting from said central shaft;

feeder means for providing a constant axial rotational motion to said central shaft hydraulically automatically synchronized with movement in either direction of said mobile support frame for smooth feeding of tree canopies passed said tines; and

beater means for selectively superimposing an oscillatory component to said constant rotational motion, whereby said tines are oscillated in their rotational plane for impacting tree canopies to detach fruit therefrom.

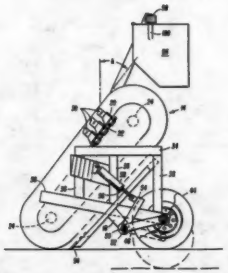
4,976,095

COMPOST WINDROW TURNER

Bradley J. Schaittjer, Delhi, Iowa, assignor to American Trencher, Inc., Delhi, Iowa

Filed May 5, 1989, Ser. No. 347,823
Int. Cl.[5] A01D *43/04, 61/02*
U.S. Cl. 56—350 **9 Claims**

1. An apparatus movable by a prime mover having a loader bucket for treating collected waste material that is stored on the ground, said apparatus comprising an elevator conveyor for picking up the waste material and elevating it as the conveyor is moved forwardly, said conveyor including a plurality of teeth for shredding and mixing the material as it is elevated, a frame for supporting said conveyor, ground engaging wheels supporting the frame, and attachment means connected to the frame along one side of the conveyor and providing for removable attachment of the loader bucket of the prime mover to the apparatus, said attachment means includes a support arm connected to the frame and extending outwardly to one side, a pair of vertically spaced-apart clamping plates carried by the support arm, and gripping means extending inwardly from each of the clamping plates, the gripping means on one of the plates being movable toward and away from the other plate to selectively grip and release the loader bucket of the prime mover.



4,976,096

SYSTEM FOR PRODUCING CORE/WRAP YARN

A. Paul S. Sawhney, Metairie; Craig L. Folk, and Kearny Q. Robert, both of New Orleans, all of La., assignors to The United States of America as represented by the Secretary of Agriculture, Washington, D.C.

Filed Jun. 15, 1989, Ser. No. 366,702
Int. Cl.[5] D02G *3/36;* D01H *5/26, 13/02, 13/04*
U.S. Cl. 57—12 **20 Claims**

1. A ring-spinning system for forming core/wrap yarn comprising

a. a drafting frame including front draft rollers having a nip therebetween;

b. a wind-up spindle assembly;

c. stationary support means immediately downstream from said nip, said support means having an outwardly, downwardly curved support surface, said surface having an open channel therein extending along said outwardly, downwardly curved surface;

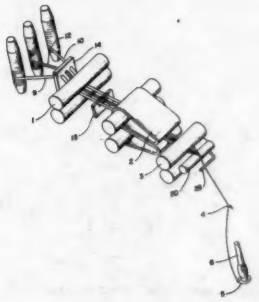
d. means to feed a core strand and at least one wrap strand on each side of said core strand from said nip onto said support means, wherein said wrap strands are spaced from said core roving at said nip and converge with said core strand in said open channel to wrap around said core strand in said open channel so as to form wrapped yarn; and

e. means to guide said wrapped yarn to said wind-up spindle assembly.

10. A method of forming core/wrap yarn on a ring-spinning system that includes a wind-up spindle assembly and a drafting

frame having a pair of front rollers defining a nip therebetween comprising

a. passing a core strand and wrap strands on each side of said core strand from said nip of a pair of rollers to a stationary support surface that is outwardly, downwardly curved, and which includes an open channel therein which is outwardly, downwardly curved along said surface,



wherein said wrap strands are spaced from said core strand at said nip;

b. passing said core strand through said channel;

c. passing said wrap strands to said channel to converge upon and wrap around said core strand in said channel to form wrapped yarn in said channel; and

d. passing said wrapped yarn from said channel to said wind-up spindle assembly.

4,976,097

LEVEL-DYEABLE MIX-SPUN FALSE-TWISTED YARN

Masaaki Yanagihara, Iyo; Katsutoshi Taniguchi, Matsuyama, and Masakazu Fujita, Ikoma, all of Japan, assignors to Teijin Limited, Osaka, Japan

PCT No. PCT/JP88/01267, § 371 Date Aug. 15, 1989, § 102(e) Date Aug. 15, 1989, PCT Pub. No. WO89/05877, PCT Pub. Date Jun. 29, 1989

PCT Filed Dec. 14, 1988, Ser. No. 400,115

Claims priority, application Japan, Dec. 23, 1987, 62-323685

Int. Cl.[5] D02G *3/36*

U.S. Cl. 57—208 **7 Claims**

1. A level dyeable mixed false-twisted filament yarn comprising at least two types of multifilament bundles having a different denier and ultimate elongation of individual filaments, and simultaneously satisfying the requirements (i) to (iv):

(i) the large denier individual filaments have a denier of 1 to 2.5,

(ii) the smaller denier individual filaments have fine crimps and a denier of 0.6 or less,

(iii) the degree of flatness of the larger denier filaments is 1.5 or less and the number (f_1) of the larger denier filaments in the bundle thereof is 15 to 50, and

(iv) the degree of flatness of the smaller denier filaments is higher than that of the larger denier filaments and the number (f_2) of the smaller denier filaments in the bundle thereof is at least 100,

said yarn having entangled portions and opened portions alternately formed along the longitudinal direction of the yarn,

(a) said opened portions each comprising a core composed mainly of the larger denier filaments and a covering composed mainly of opened smaller denier filaments extending obliquely to the longitudinal axis of the yarn and intersecting one another, and scattered in the covering,

(b) the length (L_1) of the opened portions being longer than the length (L_2) of the entangled portions, and

(c) in a unit length of the false-twisted filament yarn, the smaller denier filaments being longer than the larger denier filaments and this difference in length being 5 to 12% based on the length of the larger denier filaments.

4,976,098

METHOD AND APPARATUS FOR DISSIPATING HEAT FROM A TEXTILE MACHINE

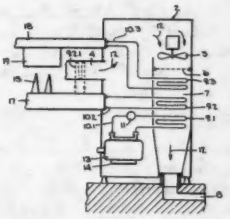
Urs Meyer, Niederglatt, and Andre Lattion, Seuzach, both of Switzerland, assignors to Rieter Machine Works, Ltd., Winterthur, Switzerland

Filed Jan. 31, 1989, Ser. No. 304,799

Claims priority, application Switzerland, Jan. 30, 1988, 00313/88

Int. Cl.[5] D01H *13/28*; F24F *7/00*

U.S. Cl. 57—308 **23 Claims**



1. A method of dissipating heat from a room containing textile machines, said method comprising the steps of

drawing an air stream under suction through a textile machine to remove dust and fly from the textile machine;

circulating a cooling fluid through at least one closed circuit to cool heat-emitting parts of the textile machine while heating the cooling fluid;

passing the heated cooling fluid in heat exchange relation with said air stream to cool the cooling liquid while heating said air stream; and

guiding the heated air stream out of the room.

4,976,099

SLIVER FEEDING AND OPENING DEVICE OF AN OPEN END SPINNING MACHINE

Karl-Josef Brockmanns, Willich, and Theo Lembeck, Monchengladbach, both of Fed. Rep. of Germany, assignors to W. Schlafhorst & Co., Fed. Rep. of Germany

Filed Mar. 28, 1990, Ser. No. 500,362

Claims priority, application Fed. Rep. of Germany, Mar. 30, 1989, 3910292

Int. Cl.[5] D01H *4/30, 4/32, 4/36, 4/38*

U.S. Cl. 57—411 **6 Claims**

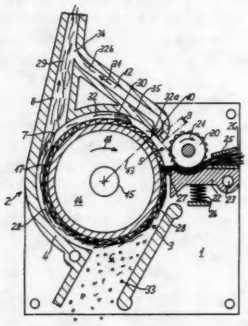
1. A sliver feeding and opening device for feeding separated sliver fibers to the rotor of an open-end spinning machine, comprising:

a housing having an interior chamber with a generally cylindrical wall;

an intake opening for the intake of sliver into said chamber housing;

an outlet passage means extending from said housing chamber to the rotor for the passage therethrough of separated sliver fibers which become entrained in an outlet stream of air flowing from said housing chamber to the rotor in response to a pressure differential therebetween, said outlet passage means including an outlet opening at said chamber wall;

an opening roller having an axis and rotatably disposed in said housing chamber concentric with said wall and rotat-



able in an opening direction to effect opening of sliver following the intaking thereof through said intake opening during transport of the sliver to said outlet opening, the rotation of said opening roller producing a stream of air revolving concentrically with said opening roller and said wall in the region between said opening roller and said wall;

an intermediate opening in said chamber wall at a location downstream of said outlet opening and upstream of said intake opening with respect to said opening direction; and

an air stream reduction conduit extending from said intermediate opening to said outlet passage means for conducting air from said revolving stream of air to said outlet passage means.

4,976,100

SYSTEM AND METHOD FOR HEAT RECOVERY IN A COMBINED CYCLE POWER PLANT

Richard M. Lee, Media, Pa., assignor to Westinghouse Electric Corp., Pittsburgh, Pa.

Filed Jun. 1, 1989, Ser. No. 359,531

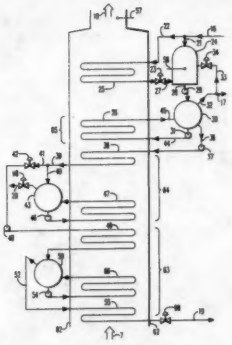
Int. Cl.[5] F02C *6/18*

U.S. Cl. 60—39.02 **14 Claims**

1. In a combined cycle power plant having a gas turbine, a steam turbine, and a heat recovery steam generator, a method of recovering heat from the exhaust gas of said gas turbine in said heat recovery steam generator comprising the steps of:

(a) supplying water, splitting said water supplied into first and second streams, directing said first stream to a vessel, directing said second stream to a feedwater heater, transferring heat from said exhaust gas to said second stream in said feedwater heater, directing said second stream after said heating in said feedwater heater to said vessel, said heated water providing a first source of heat input to said vessel, mixing said first and second streams in said vessel, thereby producing heated feedwater;

(b) regulating the relative quantities of said first and second streams of said water supplied so as to maintain a predetermined pressure in said vessel; and



(c) venting from said vessel gases released from said heated feedwater mixture.

4,976,101

COMBINED GAS AND STEAM TURBINE POWER GENERATING STATION

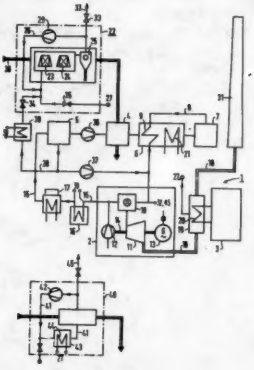
Ulrich Schiffers, Eckental, Fed. Rep. of Germany, assignor to Siemens Aktiengesellschaft, Munich, Fed. Rep. of Germany

Continuation of Ser. No. 902,163, Aug. 29, 1986, abandoned. This application Mar. 28, 1989, Ser. No. 330,974

Claims priority, application Fed. Rep. of Germany, Sep. 2, 1985, 3531305

Int. Cl.[5] F02C *3/28, 6/18*

U.S. Cl. 60—39.12 **4 Claims**



1. Combined gas and steam turbine power generating plant, comprising a gas turbine, a combustion chamber of said gas turbine, an exhaust gas line of said gas turbine carrying tangible heat; a coal preparation plant including a coal milling and drying device and a coal gasifier with a coal side connected to said coal milling and drying device and a gas side; an air decomposition plant connected upstream of said coal gasifier on said gas side; a heat exchanger plant and a gas purifier connected downstream of said coal gasifier on said gas side including a pure gas line connected to said combustion chamber; a waste heat boiler connected to said exhaust gas line; means for utilizing said tangible heat in said exhaust gas line for drying

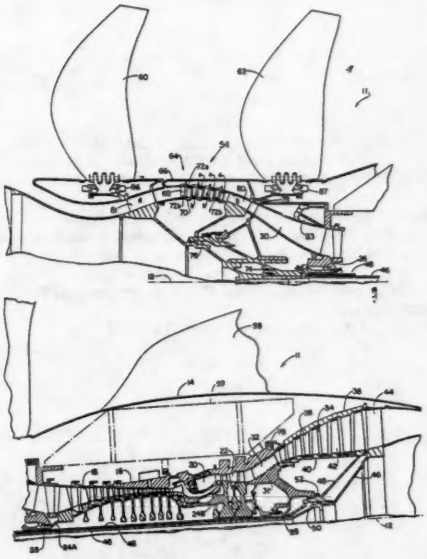
milled coal in said coal preparation plant, said tangible heat utilizing means being in the form of means for circulating an inert drying medium in the form of feedback gas through said milling and drying device, for removing partial quantities of the drying medium loaded with moisture and for replacing the partial quantities with new heated drying medium continuously, another heat exchanger, means for circulating a heating medium through said other heat exchanger and said milling and drying device, and means for transporting an inert gas in a loop through said other heat exchanger.

4,976,102

UNDUCTED, COUNTERROTATING GEARLESS FRONT FAN ENGINE

John B. Taylor, Cincinnati, Ohio, assignor to General Electric Company, Cincinnati, Ohio

Filed May 9, 1988, Ser. No. 191,529
Int. Cl.[5] F02K 3/072
U.S. Cl. 60—226.1 **24 Claims**



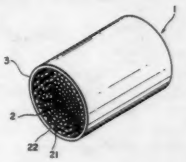
1. A high bypass ratio gas turbine engine comprising:
a core engine effective for generating combustion gases passing through a main flow path;
a power turbine aft of said core engine and including first and second counter rotatable interdigitated turbine blade rows effective for counterrotating first and second drive shafts, respectively;
an unducted fan section forward of said core engine including a first fan blade row connected to said first drive shaft and a second fan blade row axially spaced aftward from said first fan blade row and connected to said second drive shaft, and
a booster compressor axially positioned between said first and second fan blade rows and including a plurality of first compressor blade rows connected to said first drive shaft and a plurality of second compressor blade rows connected to said second drive shaft.

4,976,103

METAL-MADE CARRIER BODY FOR CARRYING THEREON EXHAUST GAS CLEANING CATALYST

Kazunori Takikawa, and Haruo Serizawa, both of Shizuoka, Japan, assignors to Usui Kokusai Sangyo Kabushiki Kaisha, Japan

Filed Jun. 16, 1989, Ser. No. 366,990
Int. Cl.[5] F01N 3/28
U.S. Cl. 60—299 **5 Claims**



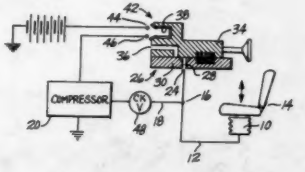
1. A metal-made carrier body for carrying thereon an exhaust gas cleaning catalyst, said carrier body having been formed by superposing a sheet-like metal band made of a thin metal sheet and a corrugated band made from another thin metal sheet one over the other in a contiguous relation into a multi-layered composite body defining many network-patterned gas flow passages along a central axis thereof, and then enclosing the multi-layered composite body within a cylindrical metal casing, characterized in that the cylindrical metal casing has a double-layer structure composed of an inner portion made of a metal material having a coefficient of thermal expansion similar to that of the constituent members of the multi-layered composite body and an outer portion made of another metal material having greater heat- and corrosion-resistance than the metal material of the inner portion.

4,976,104

COMBINED SWITCH AND VALVE FOR COMPRESSOR POWERED INFLATABLE

John M. Morris, Auburn, and Roger St. John, Seattle, both of Wash., assignors to GT Development Corporation, Seattle, Wash.

Filed Dec. 22, 1988, Ser. No. 288,697
Int. Cl.[5] A47C 3/30
U.S. Cl. 60—412 **15 Claims**



1. An inflation/deflation system, comprising:
an inflatable including a combination inlet-outlet;
an electric air compressor including an outlet;
a combination valve and switch;
an electrical control circuit for the compressor including said switch;
an air exhaust system for said inflatable including said valve and an exhaust passageway leading from said inflatable in which said valve is located;
wherein said combination valve and switch includes a single control member movable to close the switch and make the compressor functional for delivering compressed air to the inflatable, and also movable for opening the valve to exhaust air from the inflatable;

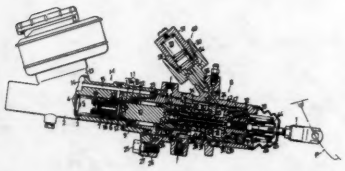
wherein the inflatable is an air bag within a vehicle seat; and
wherein the combination valve and switch further comprises:
a housing including a slide chamber, a first fluid port bounding the slide chamber, a second fluid port spaced from the first port and also bounding the slide chamber;
a three position slide member in said slide chamber, said slide member including a passageway which communicates the two ports when the slide member is in a first of said positions and a portion which blocks flow between the two ports when the slide member is in the second and third of said positions;
a pair of spaced apart electrical switch contacts carried by said housing;
a circuit making conductor carried by the slide member and positioned to engage both of the switch contacts when the slide member is in its third position, said conductor being in a circuit breaking spaced relationship from these contacts when the slide member is in its first and second switch position;
wherein the second position of the slide member is a neutral position in which the valve is closed and the switch is opened;
wherein movement of the slide member from the second position to the first position opens the valve with the switch remaining open;
wherein movement of the slide member from the second position to the third position closes the switch with the valve remaining closed; and
an inlet passageway in said housing leading to the first fluid port; and
said system including a conduit connecting said inlet passageway to the inlet-outlet of said inflatable; and
wherein said second fluid port of said valve is disposed to discharge to atmosphere.

4,976,105

HYDRAULIC BOOSTER SYSTEM WITH ACCUMULATOR

Makoto Horiuchi; Atsushi Shimizu, both of Ueda; Yoshitaka Miyakawa, and Kazuya Sakurai, both of Wako, all of Japan, assignors to Nissin Kogyo Kabushiki Kaisha, Ueda and Honda Giken Kogyo Kabushiki Kaisha, Tokyo, both of, Japan

Filed Nov. 22, 1988, Ser. No. 274,579
Claims priority, application Japan, Nov. 27, 1987, 62-299001; Mar. 25, 1988, 63-71600
Int. Cl.[5] B60T *13/14, 13/12*
U.S. Cl. 60—413 **18 Claims**



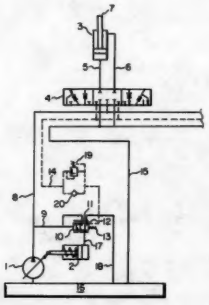
1. A hydraulic booster system comprising:
a booster cylinder connected to a rear end of a cylinder body of a master cylinder;
an inlet valve interposed between an output hydraulic pressure chamber defined to face a back of a booster piston and an input hydraulic pressure chamber leading to a hydraulic pressure supply source, said booster piston being received in said booster cylinder for forward and rearward movement and being spring-biased rearwardly, said inlet valve being adapted to be opened in accordance with an advancing operation of a valve piston, slidably disposed in said booster piston and movable relative thereto, said valve piston being connected to an operating member;
an outlet valve interposed between said output hydraulic pressure chamber and an outlet chamber leading to an oil tank and adapted to be closed in accordance with an advancing operation of said valve piston relative to said booster piston;
a booster chamber provided to face a rear end of an operation piston of the master cylinder;
an oil feed passage made in said valve piston and adapted to permit communication between said input hydraulic pressure chamber and said booster chamber in response to opening of said inlet valve and further permit communication between said booster chamber and said outlet chamber in response to opening of said outlet valve;
a reaction chamber provided to face a front surface of said booster piston and adapted to be reduced in volume in accordance with the advancing movement of said booster piston; and
an accumulator connected to said booster cylinder so as to lead to said reaction chamber.

4,976,106

LOAD-SENSING VARIABLE DISPLACEMENT PUMP CONTROLLER WITH ADJUSTABLE PRESSURE-COMPENSATED FLOW CONTROL VALVE IN FEEDBACK PATH

Juergen Noerskau, Lohr, and Georg Klingenbeck, Klingenberg, both of Fed. Rep. of Germany, assignors to Linde Aktiengesellschaft, Fed. Rep. of Germany

Filed Feb. 13, 1989, Ser. No. 310,787
Claims priority, application Fed. Rep. of Germany, Feb. 18, 1988, 3805061
Int. Cl.[5] F15B *11/02, 11/16;* F04B *1/08*
U.S. Cl. 60—452 **6 Claims**



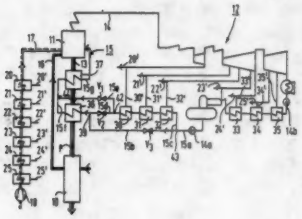
1. In a hydraulic switching system having a hydraulic pump with an adjustable delivery volume, at least one hydraulic energy consumer, a multiway valve connected to said hydraulic energy consumer, a pump regulating unit loaded with pump outlet pressure, a load-sensing regulator connected to said pump regulating unit and a control pressure line connected to said multiway valve to be loaded with pressure by said hydraulic energy consumer, the improvement comprising pressure-compensated flow control valve means operatively connected in said control pressure line between said multiway valve and said load-sensing regulator.

4,976,107

PROCEDURE FOR IMPROVING THE EFFICIENCY OF A STEAM POWER PLANT PROCESS

Timo Korpela, Pohjantie 4 C, 02100 Espoo, Finland

Continuation of Ser. No. 314,117, Feb. 15, 1989, abandoned.
This application Jan. 31, 1990, Ser. No. 472,815
Claims priority, application Finland, Jun. 18, 1987, 872723
Int. Cl.[5] F23G *5/04*
U.S. Cl. 60—670 6 Claims



1. A method for improving efficiency in a steam power plant, said method comprising the steps of:

inputting damp fuel into a wet fuel dryer;

conducting dried fuel from said dryer to a boiler;

feeding combustion air into said boiler;

feeding feed water into said boiler;

feeding steam from said boiler to a turbine; and

feeding at least part of at least one flue gas from said boiler through said dryer such that said flue gas or gases aid in drying said damp fuel;

cooling the flue gas or gases being outputted from said boiler to said wet fuel dryer by using said feed water and/or combustion air;

controlling the respective temperature or temperatures of said flue gas or gases being output from said boiler to said wet fuel dryer by controlling the temperatures or amounts of said combustion air and feed water being used for the cooling of said gases; and

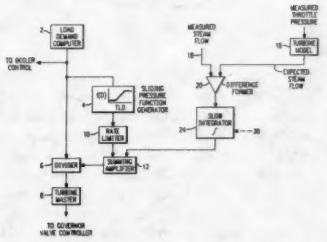
controlling the respective temperatures of said combustion air and said feed water by use of steam tapped from said turbine.

4,976,108

TURBINE EFFICIENT VALVE POSITION COMPUTER

Morton H. Binstock, Pittsburgh, and Walter B. Shaltes, Saxonburg, both of Pa., assignors to Westinghouse Electric Corp., Pittsburgh, Pa.

Filed May 11, 1990, Ser. No. 521,869
Int. Cl.[5] F01K *13/02*
U.S. Cl. 60—660 8 Claims



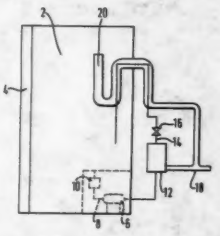
1. In a method for controlling the operation of a steam turbine system, which system includes a source of steam under pressure, means for varying pressure of the steam being produced by the source, a throttle valve connected to conduct steam from the source, a steam turbine having a first stage, a plurality of governor valves connected between the throttle valve and the turbine first stage, each governor valve being movable between two selected positions each creating minimum steam flow throttling losses, system control means for producing a system control signal representative of the desired power level to be supplied by the turbine system, and governor valve control means connected for producing a valve control signal in response to an input signal and for positioning each governor valve in accordance with the value of the valve control signal, which method includes giving the input signal to the governor valve control means a value which is based on the system control signal and which causes the valve control signal to have a value which will place each governor valve at least approximately at a selected position, the improvement wherein said method comprises: measuring the rate of flow of steam from the steam source; determining the difference between the measured rate of flow and the expected rate of flow of steam from the steam source; and modifying the value of the input signal to the governor valve control means in response to the difference determined in said determining step in a direction to vary the positions of the governor valves in a manner to reduce the magnitude of that difference.

4,976,109

REFRIGERATED CONTAINERS

Michael E. Garrett, Woking, England, assignor to The BOC Group, Inc., Murray Hill, N.J.

Filed Sep. 7, 1989, Ser. No. 404,301
Claims priority, application United Kingdom, Sep. 9, 1988, 8821231
Int. Cl.[5] F25J *3/08*
U.S. Cl. 62—18 7 Claims



1. An apparatus comprising: a refrigerated container; an air compressor having an inlet in communication with ambient atmosphere and an outlet for discharging compressed air; gas separation vessel means for separating oxygen and water vapour from the air; the gas separation vessel means having an inlet port in communication with the outlet of the compressor and an outlet port for discharging air depleted in oxygen and water vapour communicating with the interior of the container; and the container having a vent tube communicating with the interior of the container for venting atmosphere within the container displaced by the depleted air.

4,976,110

SUPPORT SYSTEM FOR VACUUM INSULATED CYLINDRICAL CRYOGENIC VESSELS

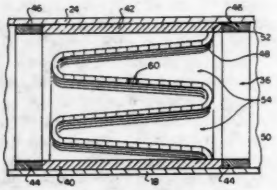
Roy C. Reid, Calgary, Canada, assignor to Altank Industries Ltd., Calgary, Canada

Filed Apr. 7, 1989, Ser. No. 334,576
Claims priority, application Canada, Apr. 3, 1989, 595563
Int. Cl.[5] F17C *1/00*
U.S. Cl. 62—45.1 18 Claims

1. In a cryogenic vessel having a product container and an outer jacket surrounding the product container with an insulat-

ing space therebetween, the product container and the jacket being concentric about a common axis, a support for supporting the product container in the outer jacket, said support comprising:

an annular sheet of cryogenically acceptable material with a



plurality of annular corrugations therein a median plane through the corrugations being perpendicular to the axis;

outer support means supporting the outer jacket on an outer edge of the sheet; and

inner support means supporting the product container on an inner edge of the sheet.

4,976,111

CRYOGENIC CONDENSATION PUMP

Marxen P. Larin, prospekt Nauki, 29, kv. 78, Leningrad, U.S.S.R.

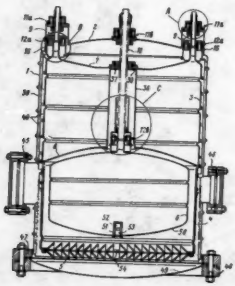
PCT No. PCT/SU88/00254, § 371 Date Sep. 7, 1989, § 102(e) Date Sep. 7, 1989, PCT Pub. No. WO89/06317, PCT Pub. Date Jul. 13, 1989

PCT Filed Dec. 7, 1988, Ser. No. 415,295

Claims priority, application U.S.S.R., Jan. 8, 1988, 4360458

Int. Cl.[5] B01D *8/00*

U.S. Cl. 62—55.5 **5 Claims**



1. A cryogenic condensation pump comprising a housing made of a metal having low specific weight; a radiation shield accommodated in said housing, made of a metal having low specific weight and comprised of a cryoagent vessel, a shell heat line and a chevron baffle properly interconnected; a pump-out element in the form of a vessel made of a metal having low specific weight and located in a cavity defined by a bottom of said cryoagent vessel, said shell heat line and said chevron baffle; first and second suspension pipes connected, respectively, to the cryoagent vessel and the pump-out element;

assemblies for joining said first and second suspension pipes to said housing, each of said assemblies comprising a flange on said housing with an annular projection; a branch pipe located in a hole in said flange in said housing and having a first end hermetically secured on said suspension pipe; a collar provided on a second end of said branch pipe and having an annular projection facing the flange on said housing and said annular projection matching said annular projection on said flange of said housing; a sealing metal gasket installed between said annular projections of said collar and said flange of said housing; an annular flange secured in a middle portion of said branch pipe; and stop bolts installed in said annular flange in said middle portion of said branch pipe and said stop bolts being in contact with said flange of said housing;

assemblies for joining said first and second suspension pipes to the cryoagent vessel or to the pump-out element, each assembly comprising a branch pipe having an end sealing collar hermetically joined to a neck of the cryoagent vessel or the pump-out element; first and second flanges joined together and having end faces facing each other, said first flange being hermetically attached at a second end of the suspension pipe and the second flange being installed at a end of said branch pipe, the surfaces of said flanges facing each other being provided with annular projections and said end sealing collar being located between the annular projections of said flanges;

a support bush provided on the surface of said second suspension pipe; and an annular element in contact with said support bush and being fixed in a cover of said cryoagent vessel.

4,976,112

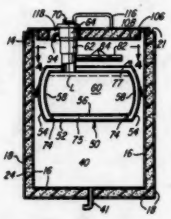
COLD STORAGE CABINET USING LIQUIFIED GAS

Mason R. Roberts, 1250 Hidden Oaks Dr., Centerville, Ohio 45459, and G. Robb Means, 305 N. Winter, Yellow Springs, Ohio 45387

Filed Jan. 12, 1990, Ser. No. 464,375

Int. Cl.[5] F17C *7/04*

U.S. Cl. 62—48.1 **19 Claims**



1. A cold storage cabinet adapted to be transported and to maintain food products in a refrigerated state, comprising an insulated container defining a storage chamber having an access opening for receiving products to be cooled, door means mounted on said container for normally closing said opening and being movable to provide for access to said storage chamber, a tank disposed within said storage chamber and having insulated walls defining an enclosed tank chamber, inlet means extending into said tank for introducing a supply of liquified gas into said tank chamber, means for venting vapor from said tank chamber into said storage chamber, and means for controlling the heat transfer from said storage chamber through said insulated walls of said tank for absorption by the liquified gas within said tank chamber for controlling the temperature within said storage chamber.

4,976,113
APPARATUS FOR INDIRECT EVAPORATIVE GAS COOLING

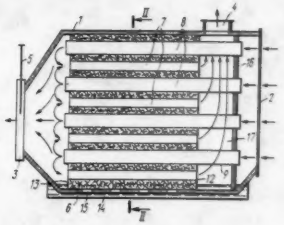
Alexandr N. Gershuni, ulitsa Ulyanovykh, 33, kv. 19, Kiev; Valery S. Maisotsenko, ulitsa Sadovaya, 2I, kv. 7; Alexandr A. Kaminnik, I Vodo provodny pereulok, 9, kv. 7, both of Odessa; Vladilen K. Zaripov, ulitsa Tychiny, I2a, kv. 66, Kiev; Alexandr P. Nischik, ulitsa Raduzhnaya, II, kv. 40, Kiev, and Alexandr I. Levterov, ulitsa T. Draizera, 8a, kv. 54, Kiev, all of U.S.S.R.

PCT No. PCT/SU88/00169, § 371 Date Apr. 25, 1990, § 102(e) Date Apr. 25, 1990, PCT Pub. No. WO90/02305, PCT Pub. Date Mar. 8, 1990

PCT Filed Aug. 26, 1988, Ser. No. 477,893

Int. Cl.[5] F28D *5/00*

U.S. Cl. 62—314 **2 Claims**



1. An apparatus for indirect-evaporative gas cooling, comprising a shell (1) with a total gas stream inlet fitting (2), and outlet fittings (3, 4) respectively for a main stream and an auxiliary stream which flows counter-currently to the main-stream, and a plurality of moist ducts (7) provided in said shell (1) and made of a wettable capillary-porous material, and of dry ducts (8) made of a moisture-proof material, both the dry and the moist ducts intercommunicate on side of the shell on which mainstream outlet fitting is located (3), and a means for feeding a liquid wetting the capillary-porous material, characterized in that the respective moist and dry ducts (7, 8) are established in a capillary-porous solid (6) placed in the shell (1), while the dry ducts (8) are essentially tubes (9) whose ends extend beyond the capillary-porous solid on a side of the shell on which the inlet fitting is located (2) and are secured in a tube plate (16) spaced apart from the capillary-porous solid (6) so as to define an auxiliary gas outlet chamber (17) communicating with the outlet fitting (3).

4,976,114
AIR CONDITIONING UNIT HAVING AN INTERNAL COMBUSTION ENGINE WHICH IS SUITABLE FOR MOUNTING ON THE ROOF OF A BUILDING

Thomas O. Manning, St. Louis Park, Minn., assignor to Thermo King Corporation, Minneapolis, Minn.

Filed Feb. 26, 1990, Ser. No. 484,315

Int. Cl.[5] F25B *27/00*

U.S. Cl. 62—323.1 **8 Claims**

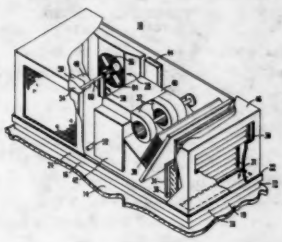
1. An air conditioning unit suitable for gasketed support and mounting on support curbing having first and second curb sides and first and second curb ends which collectively define a continuous support surface, comprising:

a metallic main unit frame having a rectangularly configured outer structure which includes first and second sides and first and second ends for support by the continuous surface of the curbing,

a metallic power pack support frame having first and second spaced parallel members substantially continuously supported along their complete lengths by the first and second sides, respectively, of the main unit frame, and third and fourth spaced parallel members each having first and second ends fixed to the first and second parallel members, respectively, with said third and fourth spaced members being unsupported between their fixed ends, such that the third and fourth members function as leaf springs,

vibration and sound absorbing means disposed between the first and second members of the power pack support frame and the main unit frame,

a refrigerant power pack assembly comprising an internal combustion engine and a refrigerant compressor mounted on a metallic support tray,



and a plurality of vibration absorbing mounts for resiliently mounting the support tray of the power pack assembly to the third and fourth spaced members of the power pack support frame, with each of said plurality of vibration absorbing mounts being spaced inwardly from a selected end of the third and fourth members.

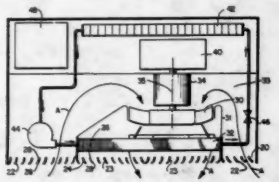
4,976,115
CAMBERED CONDENSER GRILL

Mark R. Hogan, Manlius, N.Y., assignor to Carrier Corporation, Syracuse, N.Y.

Filed Aug. 21, 1989, Ser. No. 396,264

Int. Cl.[5] F25D *17/06*

U.S. Cl. 62—428 **6 Claims**



1. An outdoor portion of an air conditioning unit of the type having a heat exchanger and an axial fain that moves air from an outdoor environment through the heat exchanger and back to the outdoor environment, the outdoor portion including:

air passage means having an upstream inlet passage for allowing movement of the air from the outdoor environment to an inlet region of the axial fan, and a downstream discharge passage spaced from the axial fan in an axial direction for allowing movement of the air discharged from the axial fan to the outdoor environment, and

a planar grill means located in both said downstream discharge passage and said upstream inlet passage in a plane perpendicular to an axis of the axial fan including first and second discharge sections and an inlet section, each discharge section having a plurality of nonadjustable grill elements for guiding the air discharged from the axial fan to said outdoor environment, said nonadjustable grill elements of said discharge sections having a leading edge portion, a trailing edge portion and a cambered portion connecting said leading edge portion to said trailing edge portion, said first and second discharge sections being

substantially mirror images of one another about a plane parallel to said axis of the axial fan, whereby all of the air moving through said first section converges toward all of the air moving through said second section and said inlet section having a plurality of nonadjustable grill elements for guiding air from the outdoor environment into said inlet region of said axial fan, said nonadjustable grill elements of said inlet section having a leading edge portion, a trailing edge portion and a cambered portion connecting said leading edge portion to said trailing edge portion, whereby said leading edge portion of said grill elements of said inlet section are oriented oppositely of said trailing edge portion of the discharge section next adjacent said inlet section to control recirculation.

4,976,116

COLD-AIR GENERATING DEVICE

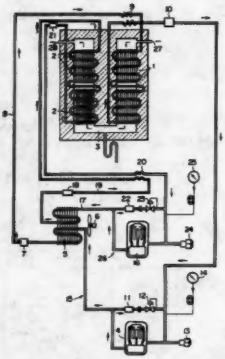
Masaharu Hayama, Yamatotakada; Kenji Takaoka, Amagasaki; Yasushi Torai, Matsudo, and Toshiharu Fukada, Soka, all of Japan, assignors to Nihon Medix Co., Ltd., Chiba, Japan

Filed Jun. 23, 1989, Ser. No. 370,752

Claims priority, application Japan, Jul. 28, 1988, 63-189090

Int. Cl.[5] F25D *11/02*

U.S. Cl. 62—441 **2 Claims**



1. A cold-air generating device, comprising:

refrigeration cycle means which includes compressor means, condenser means and evaporator means;

said evaporator means consisting of a plurality of evaporators including a first evaporator and a second evaporator;

said compressor means including a first compressor and a second compressor;

said first evaporator and said first compressor in combination providing a first refrigeration cycle which cools air to such a degree that the water contained therein will not become frozen;

said second evaporator and said compressor in combination providing a second refrigerating cycle which further refrigerates the air to be dehumidified and cooled while passing through the first evaporator, down to a temperature below the freezing point of water contained in the air;

an air inlet being provided in an upper section of said first evaporator so that a downward airflow is generated therein;

an air-outlet being provided in an upper section of said second evaporator so that an upward airflow is generated therein;

the respective low sections of the first and second evaporators being connected to each other through a drain pan.

4,976,117

DEVICE AND PROCESS FOR PRODUCING COLD AND/OR HEAT BY SOLID-GAS REACTION

Georges Crozat, Perpignan, and Michel Lebrun, Elancourt, both of France, assignors to Faiveley Enterprises, St. Ouen and Societe Nationale Elf Aquitaine, Courbevoie, both of, France

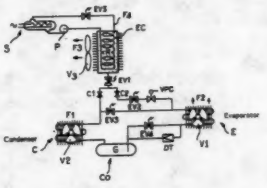
PCT No. PCT/FR88/00256, § 371 Date Feb. 27, 1989, § 102(e) Date Feb. 27, 1989, PCT Pub. No. WO88/09466, PCT Pub. Date Dec. 1, 1988

PCT Filed May 20, 1988, Ser. No. 314,827

Claims priority, application France, May 22, 1987, 87 07210

Int. Cl.[5] F25B *17/08*

U.S. Cl. 62—480 **12 Claims**



1. device for producing cold, comprising two reactors (R1, R2) which contain a solid compound capable of reacting with a gas according to an exothermic reaction, these reactors being connected to a condenser (C), a gas collector (Co) and an evaporator (E), the inside of the reactors being in a heat exchange relationship with a heat source (S), means being provided for successively starting the solid-gas reactions in the two reactors and for producing the openings and closings of various communication circuits between the reactors, the condenser, the collector and the condenser, in a predetermined order to obtain a continuous production of cold, which comprises means for starting the defrosting, these means being adapted for producing the following operations:

closing of the circuit between the two reactors (R1) and (R2), opening of the circuit between the evaporator (E) and the condenser (C) and opening of the circuit between the evaporator (E) and the gas collector (Co).

4,976,118

METHOD FOR PRODUCING BACKING MATERIAL FOR CARPET UNDERLAY

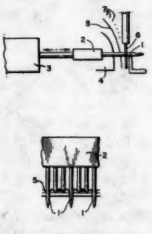
William H. Tough, Tayport, Scotland, assignor to Scott & Fyfe Limited, Fife, Scotland

Filed Nov. 17, 1988, Ser. No. 272,433

Claims priority, application United Kingdom, Nov. 24, 1987, 87.27449

Int. Cl.[5] D04B *23/10, 15/20*

U.S. Cl. 66—85 A **6 Claims**



1. A method of producing a backing material for a carpet underlay by forming a series of side-by-side rows of stitches in a crepe paper sheet which method further includes the step of deforming the crepe paper sheet without puncturing the crepe

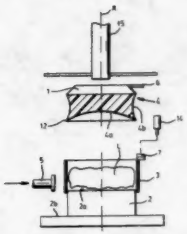
paper sheet to form at least one row of projections in the crepe paper sheet between each pair of side-by-side rows of stitches.

4,976,119

PISTON-TYPE APPARATUS FOR EXPRESSING WATER FROM LAUNDRY

Egon Hartmann, Schellerten, Fed. Rep. of Germany, assignor to Senkingwerke GmbH & Co., Hildesheim, Fed. Rep. of Germany

Filed Dec. 21, 1983, Ser. No. 563,921
Claims priority, application Fed. Rep. of Germany, Dec. 22, 1982, 3247468; Apr. 9, 1983, 3312808
Int. Cl.[5] D06F *47/04*
U.S. Cl. 68—242 5 Claims



1. An apparatus for expressing liquid from a load of laundry, the apparatus comprising:

an upwardly open vessel having upright side walls and a floor and adapted to contain the load to be dewatered;

means including perforations in the floor for draining liquid from the vessel;

a piston above and vertically displaceable into and out of the vessel toward and away from the floor thereof and having a lower surface vertically confronting the floor of the vessel;

a relatively soft hollow cushion carried on the lower surface of the piston having a flexible and stiff skin forming a downwardly concave lower wall engageable against the laundry load on the vessel floor and a flexible and outwardly concave side wall of the same shape seen from above as the side walls of the vessel, the side and lower wall of the cushion together forming a sharp-edged lip;

a body of liquid filling the skin and below the lower surface of the piston;

actuating means connected to the piston for displacing same vertically between an upper position with the lower wall of the cushion above and outside the vessel and a lower position with the lower wall of the cushion pressing the load against the vessel floor and with the side wall of the cushion closely juxtaposed with the side walls of the vessel, the lip riding on the side wall of the vessel as the piston is displaced between its positions; and

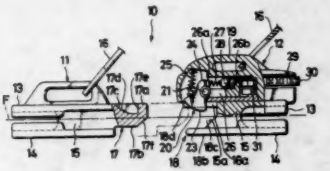
means including a sensor having an electrical contact at the upper edge of the side wall of the vessel and connected to the actuator means for inhibiting downward displacement of the piston when the load of laundry projects beyond the side-wall upper edge.

4,976,120

SLIDER LOCK ASSEMBLY

Yasuharu Terada, Uozu; Yoshiyuki Horita, Toyama; Susumu Ishii, Kurobe, and Kiyoyasu Wake, Kawaski, all of Japan, assignors to Yoshida Kogyo K. K., Tokyo, Japan

Filed Oct. 26, 1989, Ser. No. 426,763
Claims priority, application Japan, Dec. 14, 1988, 63-317007
Int. Cl.[5] E05B *67/38*
U.S. Cl. 70—68 10 Claims



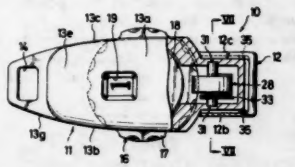
1. A slider lock assembly which comprises a pair of male slider and female slider each having an upper wing and a lower wing joined at one of their ends by a neck and defining therebetween a guide channel for the passage of a slide fastener, said ale slider having a wing extension forwardly of said neck and a lock cavity formed in the upper surface of said wing extension, and said female slider having an upper wing extension and lower wing extension extending in parallel with each other and defining therebetween a guide opening for receiving said male wing extension, a casing encompassing and attached to said upper wing of said female slider, a lock tumbler pivotally mounted in said casing to enter into and retract from said guide opening and adapted to engage with said cavity, a first spring normally urging said tumbler vertically toward said opening, a slide bracket mounted in said casing horizontally movably, a control means for selectively locking and unlocking said tumbler and a second spring normally urging the latter horizontally toward said tumbler.

4,976,121

DIAL LOCK ASSEMBLY

Kiyoyasu Wake, Kawasaki, Japan, assignor to Yoshida Kogyo K. K., Tokyo, Japan

Filed Sep. 29, 1989, Ser. No. 414,707
Int. Cl.[5] E05B *67/38*
U.S. Cl. 70—68 8 Claims



1. A dial lock assembly comprising a master lock unit and a slave lock unit releasably engageable therewith, said master lock unit comprising a casing, a dial rotatably mounted on a support pin on the base wall of said casing, a lock tumbler pivotally and vertically movably disposed within said casing and having a first lock pawl engageable with the base wall of said slave unit and a second lock pawl engageable with said dial, said tumbler having an axial pin guidedly received in vertical guide grooves in said casing, and said tumbler being normally urged downwardly toward said base wall by resilient means.

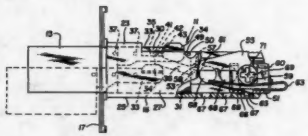
4,976,122
DEADBOLT ASSEMBLY HAVING SELECTABLE BACKSET

Martin P. Doolan, Duncanville; Dale R. Duvall, Keller, both of Tex.; Norbert J. Guetle, Jr., Cincinnati, Ohio, and Ganesh Rajagopol, Richardson, Tex., assignors to Pease Industries, Inc., Fairfield, Ohio

Continuation-in-part of Ser. No. 231,423, Aug. 15, 1988, abandoned. This application Oct. 12, 1989, Ser. No. 420,298

Int. Cl.[5] E05B *9/00*

U.S. Cl. 70—134 **10 Claims**



1. A deadbolt assembly adapted to be mounted in the edge of a door for actuation by shaft means having the axis thereof at one of a selected plurality of backset positions with respect to said door edge, comprising:

(a) a housing adapted to be mounted within the edge of a door and having top, bottom and side walls,

(b) a bolt mounted for reciprocating movement in said housing between a retracted position within said housing and an extended position wherein a portion of said bolt extends out of said housing,

(c) operating means for effecting said movement of said bolt including a lever arm having at one end thereof a pair of cylindrical hubs for receiving said shaft means therethrough,

(d) a cradle supported for movement in said housing parallel with said bolt and including a bottom and side walls enclosing said lever,

(e) said cradle side walls having recesses therein forming pivotal mountings for said lever hubs,

(f) releasable means for latching said cradle to said housing in a selected one of a plurality of locations each corresponding to a predetermined backset position,

(g) a link having forward and rearward ends,

(h) means for pivotally connecting said rearward end of said link to said lever arm,

(i) means for pivotally attaching said forward end of said link to said bolt at a selected one of a plurality of attachment points spaced longitudinally along said bolt to cause reciprocating movement of said bolt in response to oscillating movement of said lever arm, and

(j) the relative spacing of said attachment points corresponding to the relative spacing of said locations of said cradle to provide for the same throw of said bolt in all of said backset positions of said cradle.

4,976,123
LOCKS HAVING REMOVABLE BARRELS AND CONTROL TUMBLERS THEREFOR

Daniel Ceron, Bastogne; Christian Lodomez, Cherain; Paul Hano, Vaux-sur-Sure, and Jose Erard, Martelange, all of Belgium, assignors to Euro-Locks, S.A.-N.V., Bastogne, Belgium

Filed Jun. 26, 1989, Ser. No. 371,194

Claims priority, application Belgium, Jun. 28, 1988, 08800736; European Pat. Off., May 26, 1989, 89870075.2

Int. Cl.[5] E05B *29/02*

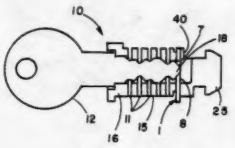
U.S. Cl. 70—369 **5 Claims**

1. In combination with a load carrier of the type having a framework including feet and bars that are removably secured thereto, wherein a portion of each of the feet is removable from the remainder thereof for permitting installation and removal of the bars, a key-activated removable cylinder lock, comprised of:

respective lock barrels, each of the lock barrels including a respective plurality of sliding combinating tumblers disposed therein for movement between respective first resting positions and respective second activated positions, each of the barrels further including a respective sliding control tumbler having a first end and a second end, the control tumblers being disposed in the respective barrels for movement between respective first resting position, wherein the first ends are extended relative to the barrels, and respective second activated positions, wherein the first ends are retracted relative to the barrels;

respective means for biasing each of the control tumblers to one of the two respective positions thereof;

each of the removable portions of the feet having a respective bore formed therethrough for rotatably receiving one of the barrels therein, the removable portions further having a respective internal longitudinal slot formed therein extending from a forward end of the bore and being in open communication with the bore, each of the feet further including a respective annular clearance space located rearwardly of the slot for accomodating extension of the first end of one of the respective control tumblers in



the resting position portions is permitted between the locking positions of the barrels, so that the portions of the feet are secured to one another preventing removal of the bars from the feet, and further between the unlocking positions of the barrels, so that the portions of the feet are unsecured from one another permitting removal of the removable portions of the feet from remainder thereof, whereby access to the bars for installation to and removal from the feet is permitted;

such that when the respective barrels are disposed in the feet with at least a portion of the combinating tumblers in the respective resting positions thereof, said combinating tumblers are received in the respective slots preventing rotational movement of the barrels in the feet for the locking and unlocking thereof;

the width of the first end of each of the control tumblers being greater than the width of the respective slots, such that the slots do not accomodate the said first ends, whereby when the control tumblers are in the respective resting positions, removal of the barrels from the feet are prevented; and

wherein insertion of a key into the barrels slidingly moves the control tumblers into the activated positions thereof permitting removal of the barrels from the feet.

4,976,124
WIRE KEY HOLDER

Calvin E. Sanders, Rte. 4, Box 367, Lake City, Fla. 32055

Continuation-in-part of Ser. No. 903,097, Sep. 2, 1986, Des. Pat. No. 302,280, which is a continuation-in-part of Ser. No. 885,438, Jul. 14, 1986, abandoned. This application Jul. 17, 1989, Ser. No. 380,284

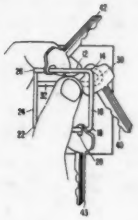
Int. Cl.[5] A47G *29/10*

U.S. Cl. 70—458 **9 Claims**

1. A method of holding keys comprising:

(a) forming a key holder from a single continuous length of multiply-bent resilient material defining two pair of sub-

stantially parallel legs forming a rectangular portion, and a third pair of legs substantially parallel to the first pair of legs forming an arcuate portion closely adjacent the second leg, and terminating the first and sixth legs substantially colinear with the fourth leg;



(b) sliding a key over the fifth and sixth legs and between the fifth and sixth legs and at least one of the legs of the rectangular portion and then sliding the key onto said at least one leg.

4,976,125

LEAF SPRING PRODUCTION

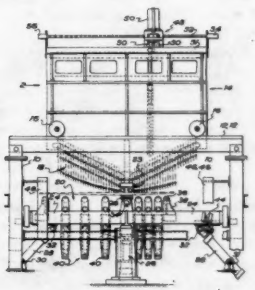
Alexander I. Wilson, Sheffield, England, assignor to Ian Wilson Technology Limited, Sheffield, England

Filed Sep. 20, 1989, Ser. No. 409,715

Claims priority, application United Kingdom, Sep. 27, 1988, 8822608

Int. Cl.[5] B21D *7/02, 53/88*

U.S. Cl. 72—21 **8 Claims**



1. A leaf spring shaping machine, comprising;

upper and lower spring forming elements one of which is constituted by a plurality of closely spaced abutment members;

means for adjusting and constantly monitoring the positions of said abutment members individually in order to adjust and maintain the effective shape of said one spring forming element;

means for bringing the other of said spring forming elements into engagement with a pre-formed blank located between said elements so that said blank is brought to the shape of said one of the elements;

means for clamping a workpiece comprising a fixed block centrally located with respect to said abutment members and a vertically movable seat clamp;

said other spring forming element comprising a pair of arms pivotally connected to, and extending outwards from, said movable seat clamp;

a central hydraulic ram connected to said seat clamp so as to be able to lift and lower said seat clamp so that a central portion of said blank can be clamped between said fixed block and said seat clamp;

a pair of outer hydraulic rams each pivotally connected to an outermost portion of said arms so as to allow said arms to move, placing oppositely extended tapered lengths of a blank into engagement with said one spring forming element when said central hydraulic ram has been extended to clamp a tapered blank in said means for clamping.

4,976,126

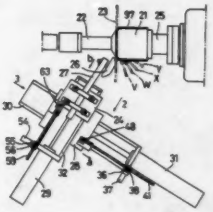
SPINNING MACHINE

Takashi Yamamoto, and Hiroshi Yamamoto, both of Higashiosaka, Japan, assignors to Kabushiki Kaisha Yamamoto Kinzoku Seisakusho, Osaka, Japan

Filed Aug. 2, 1989, Ser. No. 388,472

Int. Cl.[5] B21D *22/18*

U.S. Cl. 72—83 **5 Claims**



1. A spinning machine comprising:

rotary means for rotating a mold for having a material formed on the mold;

a first roller carriage reciprocable in first, opposite directions;

a second roller carriage supported on said first roller carriage so as to be reciprocable in second opposite directions perpendicular to said first opposite directions;

a hydraulic system for driving said roller carriages, including a first hydraulic cylinder connected to said first roller carriage for reciprocating said first roller carriage and a second hydraulic cylinder connected to said second roller carriage for reciprocating said second roller carriage;

a forming roller fixedly mounted on said second roller carriage so as to be able to be pressed against a material on a mold on said rotary means to shape the material into a predetermined shape;

a first rack extending in said first opposite directions and a second rack extending in said second opposite directions;

a lever for each said rack, said levers each being pivotally connected to both a respective said rack and a respective said roller carriage;

a servo motor for each said rack, each said servo motor having a pinion gear in meshing engagement with its respective said rack;

a servo valve mounted on each said roller carriage, each said servo valve having a movable spring-biased switch means for actuating and deactuating a respective said hydraulic cylinder in response to movement of a respective said lever, said switch means being pressed against its respective said lever;

a position controlling means for controlling the position of said roller carriages and a sequencing means for sequencing position moving operations of said roller carriages connected to said servo motors;

a pulse encoding means for each said servo motor for feeding the angle of rotation of the respective said servo motors to said position controlling means in the form of pulse signals, said position controlling means being connected to said servo motors through each said pulse encoding means;

a manual-control teaching means for feeding driving signals to said servo motors to move said forming roller in a specified pattern of movement;

wherein said driving signals fed by said manual-control teaching means are stored by said position controlling means in the form of position data and by said sequencing means in the form of operational sequence data;

wherein said first and second roller carriages are controlled based upon said position data stored by said position controlling means and operational sequence data stored by said sequencing means; and

a relief valve in said hydraulic system for reducing the hydraulic pressure on one of said first and second hydraulic cylinders in a finishing operation.

4,976,127

DOUBLE ROLLER CROSSROLLING MILL FOR PIERCING AND STRETCHING OF SOLID AND HOLLOW BLOCKS

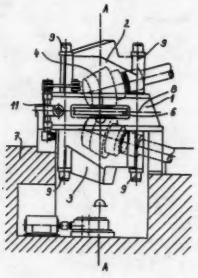
Johann H. Rohde, Ratingen, and Hans Meurer, Mönchengladbach, both of Fed. Rep. of Germany, assignors to Mannesmann Aktiengesellschaft, Dusseldorf, Fed. Rep. of Germany

PCT No. PCT/DE87/00606, § 371 Date Jun. 23, 1989, § 102(e) Date Jun. 23, 1989, PCT Pub. No. WO88/04583, PCT Pub. Date Jun. 30, 1988

PCT Filed Dec. 21, 1987, Ser. No. 382,780

Int. Cl.[5] B21B *31/04*

U.S. Cl. 72—95 **12 Claims**



1. A two-high inclined-roll mill for the piercing and stretching of a solid and hollow work piece along a rolling axis comprising:

a stationary central frame (1) for connection to a foundation (7);

two housing halves (2, 3) supported by and mounted to said central frame;

a pair of rolls (4, 5) defining therebetween a feed angle and each being displaceably mounted in said respective housing half; and

means comprising pre-tensioned tie rods for connecting said housing halves to said central frame and for movement of said housing halves relative to each other and around a common axis (A—A) perpendicularly intersecting said rolling axis (8) so as to effect adjustment of said feed angle of said rolls.

4,976,128

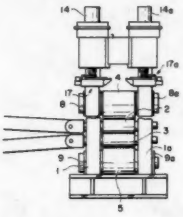
ROLLING MILL AND METHOD OF EXCHANGING ROLLS OF ROLLING MILL

Sadayoshi Tajima, Hitachi, Japan, assignor to Hitachi, Ltd., Tokyo, Japan

Filed Jul. 6, 1989, Ser. No. 375,905

Int. Cl.[5] B21B *31/08*

U.S. Cl. 72—238 **12 Claims**



1. A rolling mill, comprising:

upper and lower work rolls arranged to be brought into contact with a material to be rolled;

upper backup roll means for supporting said upper work roll;

hydraulic jack means disposed above said upper backup roll means for adding a pressurizing load which has been adjusted according to a rolling load to said upper work roll via said upper backup roll means, said hydraulic jack means including a cylinder so disposed that a cylinder bore thereof faces downward and having an upper surface, and a ram slidably received in said cylinder bore and having a lower surface which is brought into contact with said upper backup roll means, wherein a top wall of said cylinder of said hydraulic jack means is relatively thick in a central portion thereof while it is relatively thin in a periphery of the same;

thrust metal means disposed on said upper surface of said cylinder and capable of being moved between a first position at which a rolling work is performed and a second position at which said rolls are exchanged, the second position being spaced apart from the first position in an axial direction of said upper backup roll means;

pressurizing screw means adapted to abut on an upper surface of said thrust metal means for restricting an upward movement of said thrust metal means to thereby determine a position of said upper work roll when said thrust metal means is at said first position; and

actuator means mounted on said cylinder and operatively connected to said thrust metal means for moving said thrust metal means between said first position and said second position.

4,976,129

APPARATUS FOR THE AXIAL SHIFTING OF A SHAFT, ESPECIALLY OF A ROLLING-MILL ROLL

Helmut Setzer, Siegen; Axel Sprenger, Hilchenbach, and Josef Zeppenfeld, Olpe, all of Fed. Rep. of Germany, assignors to SMS Schloemann-Siemag Aktiengesellschaft, Düsseldorf, Fed. Rep. of Germany

Filed Jun. 6, 1988, Ser. No. 203,220

Claims priority, application Fed. Rep. of Germany, Jun. 4, 1987, 3718646

Int. Cl.[5] B21B *31/07*

U.S. Cl. 72—247 **6 Claims**

1. An apparatus for shifting a roll of a rolling-mill stand along its rotation axis, the apparatus comprising:

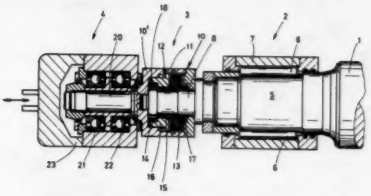
an axial-thrust bearing having a pair of relatively rotatable sides;

an actuator connected to one of the sides of the bearing and operable to axially displace the bearing;

a clamp housing carried on the other side of the bearing;

a radially elastically deformable clamping sleeve axially fixed in the housing and engageable around the stub shaft of the roll to be axially shifted;

generally complementary and radially interfittable formations on the sleeve and on the stub shaft, the sleeve being radially compressible around the stub shaft to engage the formations together and axially couple the stub shaft to the sleeve and therethrough to the clamp housing;



a piston in the clamp housing defining therein a pressurizable compartment, whereby pressurization of the compartment urges the piston axially back in the clamp housing;

at least one axially compressible spring washer engaged axially between the housing and the piston and urging the piston axially forward in the clamp housing; and

force-transmitting link means engaged between the piston and the sleeve for compressing the sleeve radially inward on displacement of the piston axially forward.

4,976,130

EXTRUDING DIE FOR METALLIC MATERIALS

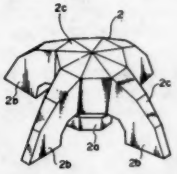
Yoshinari Oki; Takeshi Tanaka; Ryoji Tuno, all of Takaoka, and Yoshihiro Yoshida, Shinminato, all of Japan, assignors to Sankyo Aluminum Industry Company Limited, Toyama, Japan

Filed Oct. 31, 1989, Ser. No. 429,598

Claims priority, application Japan, Jan. 13, 1989, 1-7293; Mar. 8, 1989, 1-55922

Int. Cl.[5] B21C *25/04*

U.S. Cl. 72—269 **16 Claims**



1. An extruding die for metallic materials comprising:

a female die having a die hole extending therethrough and a man die having a mandrel extending into said die hole with clearance to define an extrusion slit between said mandrel and said die hole,

a plurality of spaced apart bridges connected to said mandrel with end portions engaging said female die and a convex billet-receiving face on a side thereof remote from said female die, wherein said bridges each have a decreasing width in the circumferential direction from said mandrel to said end portions.

4,976,131

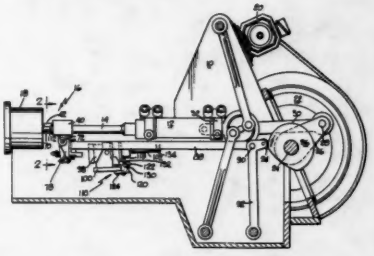
CAN BODY MAKING APPARATUS

Conrad M. Grims; Bert E. Johansson, both of Golden, and Roger A. Hahn, Arvada, all of Colo., assignors to Adolph Coors Company, Golden, Colo.

Continuation of Ser. No. 392,446, Aug. 11, 1989, Pat. No. 4,934,167, which is a continuation-in-part of Ser. No. 69,840, Jul. 1, 1987, Pat. No. 4,807,459, and a continuation-in-part of Ser. No. 126,280, Nov. 30, 1987, and a continuation-in-part of Ser. No. 315,488, Feb. 27, 1989. This application Apr. 18, 1990, Ser. No. 510,622

Int. Cl.[5] B21D *22/21*

U.S. Cl. 72—347 **20 Claims**



1. Can body making apparatus for forming can blanks into elongated can bodies comprising:

a fixedly mounted support frame;

a housing having forming and ironing dies located therein mounted on said support frame;

a redraw assembly;

an elongated ram having a first end portion having a generally cylindrical outer surface for movement into said redraw assembly to contact a can blank in said redraw assembly and to move said can blank out of said redraw assembly and through said forming and ironing dies to form an elongated can body;

said elongated ram having a second end portion;

reciprocating drive means for providing reciprocating linear movement for said elongated ram;

connecting means on said second end position for connecting said elongated ram to said reciprocating drive means;

storage means for holding a liquid;

at least one liquid bearing having a generally cylindrical inner surface having a diameter slightly greater than the diameter of said first end portion to provide for sliding movement of said first end portion through said liquid bearing;

conduit means for supplying portions of said liquid to said liquid bearing and for returning portions of said liquid to said storage means;

support means mounted on said support frame for holding said liquid bearing at a fixed location;

said redraw assembly being located between said housing and said liquid bearing; and

said elongated ram being supported solely by said liquid bearing during the reciprocation thereof by said reciprocating drive means.

4,976,132

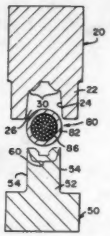
DIES FOR CRIMPING AN ELECTRICAL CONNECTION

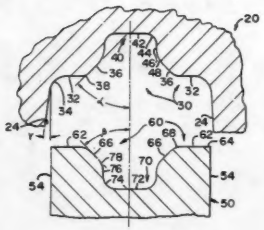
Howard Richard Shaffer, Millersburg, Pa., assignor to AMP Incorporated, Harrisburg, Pa.

Division of Ser. No. 297,817, Jan. 13, 1989, Pat. No. 4,890,384, which is a division of Ser. No. 237,684, Aug. 25, 1988, Pat. No. 4,828,516, which is a continuation of Ser. No. 567,024, Dec. 30, 1983, abandoned. This application Nov. 1, 1989, Ser. No. 430,242

Int. Cl.[5] H01R *43/048*

U.S. Cl. 72—416 13 Claims





1. Dies for crimping an electrical connection of a contact terminal to an electrical conductor comprising:

associated and opposing dies movable relative to each other along an axis and defining a crimping region therebetween having a first end and an opposing second end such that said contact terminal and said conductor are oriented in a direction intersecting said first and second ends, said crimping region extending transversely with respect to said contact terminal and said conductor after said contact terminal and conductor are positioned therewithin to be crimped,

said crimping region extending laterally between opposing confining walls of one of said dies from a first side to a second side corresponding to the width of said electrical connection, said confining walls extending from said first and second sides of said one of said dies toward the other of said dies, the other of said dies being adapted to be received and just fit between said confining walls of said one die, to apply compressive force to a said electrical connection in said crimping region laterally thereto from opposing sides of said connection,

each said confining wall being disposed at a small angle of up to 10° laterally outwardly from the direction of die movement to facilitate removal of said electrical connection from said one of said dies after crimping thereof,

each said die having a crimping surface extending between said first and second sides between which said connection is to be disposed to be crimped, and

each said crimping surface in cross section having a portion centrally between said first and second sides and containing a recessed relief area comprising about from 25 percent to 40 percent of said central portion thereof, whereby substantially no compressive force is applied by said central portions of said crimping surfaces to and along said connection.

4,976,133

INSTRUMENT FOR ADJUSTING AND CALIBRATING TORQUE WRENCHES

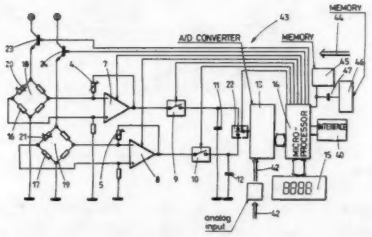
Peter Pohl, Hilden, Fed. Rep. of Germany, assignor to CDI consolidated devices inc, City of Industry, Calif.

Filed Dec. 1, 1989, Ser. No. 444,688

Claims priority, application Fed. Rep. of Germany, Dec. 2, 1988, 3840684

Int. Cl.[5] G01L *25/00*

U.S. Cl. 73—1.00 C 18 Claims



1. An instrument for adjusting and calibrating a torque applying and indicating apparatus wherein a torque applicator is operative to apply torque and a torque indicator is operative to generate first signals denoting the magnitude of torque which is applied by the applicator, comprising an input element connectable with the applicator and arranged to undergo deformation the extent of which is indicative of the magnitude of torque applied thereto by the applicator; means for monitoring the extent of deformation of said input element and for generating second signals denoting the extent of deformation of said input element and the magnitude of torque which is applied to said input element by the applicator; means for comparing said second signals with the first signals; and means for adjusting said indicator when the first signals deviate from said second signals.

4,976,134

MODIFIED GAS GAUGE

Michael J. Potvin, Wichita, Kans., assignor to The Kansas Power and Light Company, Topeka, Kans.

Filed Nov. 6, 1989, Ser. No. 432,366

Int. Cl.[5] G01F *25/00*

U.S. Cl. 73—3 2 Claims

1. A method of testing the reliability of a gas meter presenting an input end, an output end, and a gas flow detecting mechanism between said ends, said method consisting essentially of the steps of:

providing a conduit having a gas inlet end and a gas outlet end with a selectively actuatable valve interposed in the conduit between said ends, said inlet and of said conduit being adapted for coupling to said meter output end for flow of gas from said output end into and through said valve and conduit, said conduit presenting a gas flow path therethrough wherein all gas from said meter output end passes through said valve means during all phases of the meter testing method;

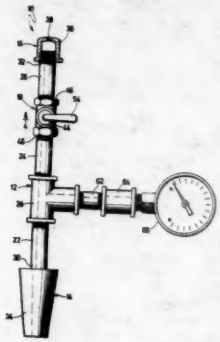
operably coupling said gas inlet end of said conduit with said meter output end for flow of gas into and through the gas flow path presented by said conduit;

manipulating said valve means to a first flow condition therethrough for establishing the flow of gas out of said valve means and conduit at a first level simulative of a first

gas flow condition through said meter, with all gas from said meter output end passing through said valve means;

thereafter changing the level of gas flow out of said conduit of manipulating said valve means to a second flow condition for establishing the flow of gas out of said valve means and conduit at a second level simulative of a second gas flow condition through said meter, with all gas from said meter output end passing through said valve means; and

inspecting said gas meter flow detecting mechanism to confirm that said mechanism is responsive to said gas flow level change.



4,976,135

APPARATUS AND METHOD FOR DETECTING GAS COMPONENTS

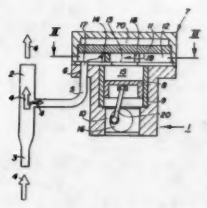
Burkhard Stock, Lubeck, Fed. Rep. of Germany, assignor to Dragerwerk Aktiengesellschaft, Lubeck, Fed. Rep. of Germany

Filed Jun. 8, 1989, Ser. No. 363,497

Claims priority, application Fed. Rep. of Germany, Feb. 18, 1989, 3904994

Int. Cl.[5] G01N *31/00*

U.S. Cl. 73—23.2 **6 Claims**



1. A device for indicating the presence of a gas component in a gas sample which is collected in a sampling tube, comprising a sensor having a housing with a measuring chamber therein, a measuring surface disposed on the interior of said housing extending along said measuring chamber, a piston and cylinder unit connected to the sampling tube through said measuring chamber, drive means to reciprocate said piston in said cylinder to draw a gas sample from the sampling tube and move it into said measuring chamber, and baffle means in said measuring chamber extending the route of travel of the gas sample in said chamber so as to increase the time said gas sample is in contact with said measuring surface wherein said measuring chamber includes an inlet connected to the sampling tube and a face wall overlying said cylinder having an opening into said cylinder above said piston, said inlet being connected into said measuring chamber, and said baffle means defined between said inlet and said cylinder defining a long tortuous flow for the gas sample, said baffle means including a curved board disposed between said measuring surface and said face wall defining a flow path from said inlet around each side of said curved board into said cylinder.

4,976,136

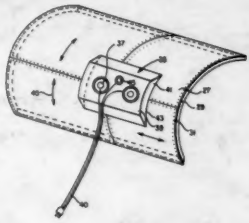
METHOD OF TESTING FOR FUSELAGE CRACKS

W. Craig Willan, P.O. Box 574, Hurst, Tex. 76053

Filed Oct. 13, 1989, Ser. No. 421,402

Int. Cl.[5] G01M *3/20*

U.S. Cl. 73—40.7 **10 Claims**



1. A method of detecting cracks and structural separations in a fuselage of an aircraft, comprising:

introducing a highly detectable gas into the interior of the fuselage;

pressurizing the interior of the fuselage to a pressure above atmospheric pressure with the gas contained therein to an amount sufficient to cause slight swelling of the fuselage; then

passing a detector over the exterior of the fuselage of a type which will detect minute amounts of the gas which might pass through any cracks and structural separations in the fuselage; and

indicating to an operator the presence of any of the gas detected.

4,976,137

CHEMICAL MIXING AND DISPENSING SYSTEM

James D. Decker, Apple Valley; Wendell D. Burch, Elko; Daniel F. Brady, Eagan; Gary W. Hinzman, St. Paul, all of Minn.; Edward P. Kromrey, Osceola, Wis.; Katherine M. Sanville, White Bear Lake, Minn.; Donald R. Southworth, Inver Grove Heights, Minn.; Mark S. Chace, New Brighton, Minn., and Perry M. Peloquin, St. Paul, Minn., assignors to Ecolab Inc., St. Paul, Minn.

Filed Jan. 6, 1989, Ser. No. 294,290

Int. Cl.[5] G01N *33/00*

U.S. Cl. 73—53 **25 Claims**

1. An apparatus for mixing and dispensing chemical solutions, comprising:

(a) a manifold having a main passage, a plurality of chemical inlet ports connected to said passage, an outlet port connected to said passage, and a water inlet port connected to a source of pressurized water;

(b) a plurality of pumps which are selectively controllable, one of said pumps being connected to each of said chemical inlet ports so as to pump a chemical solution therethrough;

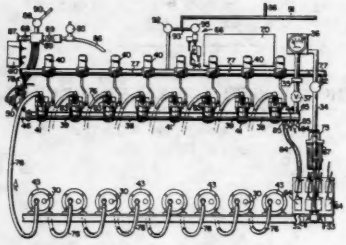
(c) selectively controllable valve means associated with each said chemical inlet ports;

(d) a dispensing outlet connected to said outlet port for dispensing said chemical solutions and water into a container; and

(e) quality control means for determining whether the

proper chemical solutions have been dispensed, wherein said quality control means comprises:

(i) means for repeatedly measuring the conductivity of the



chemical solutions flowing through said main passage of said manifold to produce a conductivity output; and

(ii) means for comparing said conductivity output with a standard conductivity output.

4,976,138

MEASURING ARRANGEMENT FOR DETERMINING THE LIQUID ABSORPTION OF PAPER

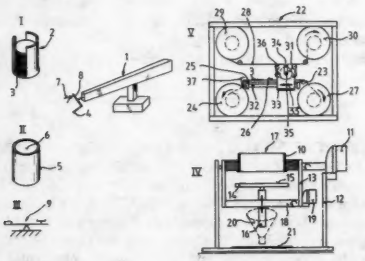
Norbert Benninghoff, Mertesheim; Manfred Jaensch, Speyer; Jaroslav Melzer, Ludwigshafen; Gunter Niesar, Neuhofen, and Werner Schuster, Hassloch, all of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

Filed May 23, 1989, Ser. No. 355,356

Claims priority, application Fed. Rep. of Germany, May 28, 1988, 3818199

Int. Cl.[5] G01N *5/02*

U.S. Cl. 73—73 **4 Claims**



1. A measuring arrangement for determining the liquid absorption of paper, comprising

a means which has a gripping apparatus and which is controllable by a program and is sequentially drivable in the spatial coordinate system toward a plurality of individual workstations, said workstations including a store and downstream thereof a balance for a paper sample, a moistening means for the paper sample and a blotting means,

said moistening means including a metal cylinder and a plate which, together with the paper sample, is capable to seal off said cylinder, said cylinder and said plate being driven toward one another by means of a working cylinder, and

said blotting means having a blotting roll and an upper and lower blotting board including said sample and each being in the form of a web connected to a material feed means and each being guided over a support area, the blotting roll being unrollable on the upper web by means of a reversing drive.

4,976,139

TROUBLE DETECTOR SYSTEM FOR AN INTAKE SYSTEM OF AN AUTOMOTIVE ENGINE

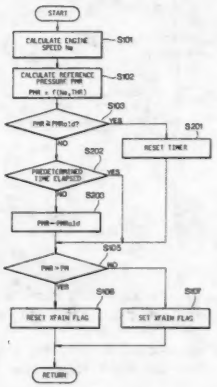
Shuji Miyama, and Hiroya Ohkumo, both of Kaisha, Japan, assignors to Fuji Jukogyo Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 300,109, Jan. 18, 1989, abandoned. This application Feb. 6, 1990, Ser. No. 477,194

Claims priority, application Japan, Feb. 16, 1988, 63-033194

Int. Cl.[5] G01M *15/00*

U.S. Cl. 73—117.3 **3 Claims**



1. A system for detecting trouble of an intake system of an engine comprising

a throttle valve in said intake system for controlling a volume of intake air,

an engine speed sensor mounted on said engine for detecting engine speed and for producing an engine speed signal,

a pressure sensor mounted on said intake system for detecting pressure of said intake air and for producing a pressure signal, and

a throttle position sensor interposed in said intake system for detecting opening degree of said throttle valve and for generating an opening degree signal, the trouble system comprising:

memory means for storing a plurality of reference values of at least one of said engine speed signal, said pressure signal and said throttle opening degree signal as a parameter in a relationship with other signals;

first calculating means responsive to said other signals for calculating said reference values at a predetermined time interval and for producing a present reference value and a previous reference value;

judging means responsive to said present and previous reference values for determining a transient state of said engine and for producing a transient signal;

second calculating means responsive to said transient signal for changing said present reference value to a corrected reference value close to said previous reference value and for delivering said corrected reference value as a delay signal; and

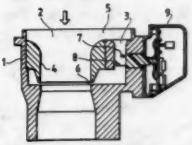
a comparator responsive to said one of said signals and said corrected reference value for comparing said one of said signals and said corrected reference value and for producing a judgement signal when said corrected reference value is smaller than said one of said signals so as to indicate said trouble.

4,976,140

INTAKE AIR FLOW RATE MEASURING APPARATUS FOR USE IN INTERNAL COMBUSTION ENGINE

Masuo Akamatsu, Katsuta, and Masayoshi Suzuki, Ohta, both of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Oct. 24, 1989, Ser. No. 426,059
Claims priority, application Japan, Nov. 2, 1988, 63-276285
Int. Cl.[5] G01F 1/68
U.S. Cl. 73—118.2 12 Claims



1. An intake air flow rate measuring apparatus for use in an internal combustion engine comprising:

a flow velocity measuring resistor arranged in an air suction passage for supplying air in an internal combustion engine;

a temperature compensating resistor arranged in the air suction passage of the internal combustion engine;

a first low pass filter connected electrically to said flow velocity measuring resistor and having an attenuation in regard to a high frequency noise;

a second low pass filter connected electrically to said temperature compensating resistor and having an attenuation in regard to a high frequency noise;

an operational amplifier having an inverting input terminal and a non-inverting input terminal and being connected to said first low pass filter and said second low pass filter, and said operational amplifier compares an output signal from said first low pass filter and an output signal from said second low pass filter; and

current control means for controlling current to supply said flow velocity measuring resistor and said temperature compensating resistor in accordance with an output signal of said operational amplifier.

4,976,141

STEPPED RIM FOR TIRE TESTING MACHINE

Barry D. Cargould, Hudson, and James C. Beebe, Kent, both of Ohio, assignors to Illinois Tool Works Inc., Chicago, Ill.

Filed Mar. 5, 1990, Ser. No. 487,832
Int. Cl.[5] G01M 17/02
U.S. Cl. 73—146 3 Claims

3. A stepped rim for a tire testing machine comprising;

an upper rim,

a lower rim spaced from said upper rim,

a plurality of bead seats on each rim differing from each other in approximately one inch increments,

a filler ring for all but the smallest bead seat, each filler ring mating with its bead seat and having an outer contour forming a continuation of the adjacent smaller bead seat to provide a surface for inflation bulge,

means for temporarily mounting each said filler ring on a bead seat,

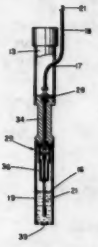
whereby said rims, with selected filler rings may be used to test a plurality of sizes of tires.

4,976,142

BOREHOLE PRESSURE AND TEMPERATURE MEASUREMENT SYSTEM

Kenneth L. Perales, Rosenberg, Tex., assignor to Baroid Technology, Inc., Houston, Tex.

Filed Oct. 17, 1989, Ser. No. 422,680
Int. Cl.[5] E21B 47/06
U.S. Cl. 73—155 20 Claims



1. Apparatus for continuously measuring fluctuating pressure and temperature of a downhole fluid in a borehole at a desired depth, the apparatus comprising:

a tube positioned within the borehole and having a flow path extending continuously from the surface to the desired depth;

a housing suspended in the borehole at the desired depth from the tube, the housing defining a chamber in fluid communication with both the downhole fluid and the flow path in the tube;

a pressurized test fluid source at the surface for initially pressuring the flow path in the tube and a portion of the chamber in the housing with a selected fluid to form an interface of the selected fluid and the downhole fluid within the chamber:

a valve for selectively isolating fluid communication between the tube and the pressurized test fluid source;

a thermocouple line including two dissimilar metal conductors positioned within the flow path of the tube and extending from the surface to the housing in the borehole;

the two dissimilar metal conductors joined to form a thermocouple junction positioned within the chamber in the housing:

a manifold at the surface for sealing the selected fluid within the flow path, the manifold having an input port for sealingly receiving the tube and thermocouple line, a thermocouple exit port for directing the thermocouple line from the manifold while sealing the selected fluid within the manifold, and a fluid exit port for directing the pressurized selected fluid from the manifold;

a pressure measuring device at the surface and in fluid communication with the fluid exit port of the manifold for measuring fluid pressure of the selected fluid to determine downhole fluid pressure at the desired depth; and

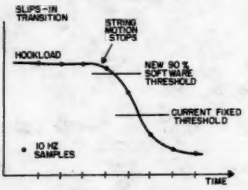
a temperature measuring device at the surface for receiving the thermocouple line extending from the manifold and measuring the temperature of the downhole fluid at the desired depth.

4,976,143

SYSTEM AND METHOD FOR MONITORING DRILL BIT DEPTH

Christopher G. Casso, Sugar Land, Tex., assignor to Anadrill, Inc., Sugar Land, Tex

Filed Oct. 4, 1989, Ser. No. 417,174
Int. Cl.[5] E21B *45/00*
U.S. Cl. 73—151.5 12 Claims



1. A method for determining at least one of a borehole depth and a depth of a drilling bit in a borehole, wherein a drilling bit is coupled to the end of a drill string which in a first mode of operation is supported by a cable line reeved around at least one rotatable sheave means supported on a mast, and in a second mode is supported by other than said cable line, and wherein means for measuring hook load and means for measuring movement of said cable line are provided, said method comprising:

(a) choosing a transition threshold for said hook load, wherein when said hook load is above said threshold it is generally assumed that said drill string is moving when said cable line is moving, and when said hook is below said transition threshold it is generally assumed that said drill string is stationary even when said cable line is moving;

(b) at least during time periods corresponding to a transition from said first mode to said second mode and during a transition from said second mode to said first mode, determining with said means for measuring hook load at a rate of at least 4 Hz said hook load on said cable line to provide first mode to second mode transition samples, and second mode to first mode transition samples;

(c) in response to said first mode to second mode transition samples, and said second mode to first mode transition samples, and said transition threshold, and in conjunction with said means for measuring movement of said cable line, determining the motion of said drill string; and

(d) in response to said determined motion of said drill string, determining at least one of said borehole depth and said depth of said drilling bit in said borehole.

4,976,144

DIAGNOSTIC APPARATUS AND METHOD FOR FLUID CONTROL VALVES

William V. Fitzgerald, McKinney, Tex., assignor to Fisher Controls International, Inc., Clayton, Mo.

Continuation of Ser. No. 236,602, Aug. 25, 1988 abandoned.
This application Apr. 10. 1990 Ser. No. 512,095
Filed Apr. 10, 1990, Ser. No. 512,095
Int. Cl.[5] G01M *19/00*; F16K *37/00*; G01L *5/00*
U.S. Cl. 73—168 5 Claims

1. Apparatus for diagnostically testing and determining the operating condition of a pneumatically operated fluid control valve, said valve having a pneumatic actuator interconnected to a valve flow control member for moving the flow control member between respective closed and open valve positions with respect to a valve seat, and a variable pneumatic pressure line connected to a valve positioner providing a variable pneumatic pressure output to the input of the pneumatic actuator for operating said valve in a test operation cycle defined by moving the flow control member along at least a portion of the movement between said respective closed and open valve positions, said apparatus comprising:

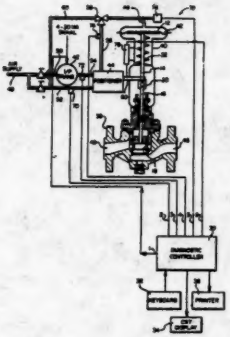
first transducer means for sensing the pneumatic pressure at the input of the pneumatic actuator during said test operation cycle and providing a corresponding first output signal for flow control member movements encompassing the fully closed valve position wherein said flow control member is seated on the valve seat;

second transducer means for sensing the movement of the flow control member during said test operation cycle, and providing a second output signal for flow control member movements encompassing the fully closed valve position;

signal processing means responsive to said first and second output signals for providing valve diagnostic data corresponding to variations in the pneumatic pressure at the input to the pneumatic actuator as a function of the movement of the flow control member during a portion of said test operation cycle corresponding to flow control member movements encompassing the fully closed valve position; and

output display means coupled to said signal processing means for displaying said valve diagnostic data and thereby enabling determination of valve seat load values for said valve under test;

said output display means including means for displaying a substantially linear relationship in said pneumatic pressure as a function of flow control member travel during said test operation cycle and displaying at least two pneumatic pressure values at the end of the test operation cycle corresponding to closing of the valve as the flow control



member initially contacts the valve seat and is then totally seated against the valve seat, said two pneumatic pressure values including a pressure value (1) at the point in flow control member travel where the pneumatic pressure abruptly changes from said linear relationship and a pressure value (2) at the point in the flow control member travel where the maximum pneumatic pressure value is reached and the pressure abruptly changes as the flow control member travel direction is reversed.

2. A method for diagnostically testing and determining the operating condition of a pneumatically operated fluid control valve having a valve actuator connected to a valve flow control member for movement between respective closed and open valve positions with respect to a valve seat, comprising the steps of:

providing a pressure sensor to sense varying pressure at the input of the valve actuator;

providing a position sensor to sense movement of the flow control member;

providing controlled variable pneumatic pressure to the input of the valve actuator to operate the valve in a test operation cycle defined by moving the flow control member along at least a portion of the movement between said respective closed and open valve positions;

obtaining a first signal from the pressure sensor correspond-

ing to varying pressure at the valve actuator input during the test operation cycle for flow control member movements encompassing the fully closed valve position wherein said flow control member is seated on the valve seat;

obtaining a second signal from the position sensor corresponding to movement of the flow control member during the test operation cycle for flow control member movements encompassing the fully closed valve position;

processing said first and second signals to derive valve diagnostic data representing the variation in pressure at the valve actuator input as a function of movement of the flow control member during the test operation cycle corresponding to flow control member movements encompassing the fully closed valve position; and

displaying said valve diagnositc data for enabling determination of valve seat load values for said valve under test;

including the steps of displaying at least two pneumatic pressure values at the end of the test operation cycle corresponding to closing of the valve as the flow control member initially contacts the valve seat and is then totally seated against the valve seat, said two pneumatic pressure values including a pressure value (1) at the first point in flow control member travel where the pneumatic pressure initally abruptyl changes in value at the end of the test operation cycle and a pressure value (2) at the second point in the continued travel of the flow control member where the maximum pneumatic pressure value is reached and the pressure again abruptly changes as the flow control member travel direction is reversed.

4,976,145

FLOW RATE METER

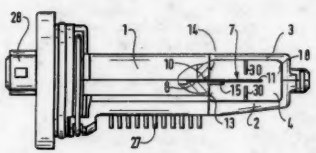
Wolfgang Kienzle, Hemmingen; Rudolf Sauer, Benningen, and Otto Woehr, Eberdingen, all of Fed. Rep. of Germany, assignors to Robert Bosch GmbH, Stuttgart, Fed. Rep. of Germany

Filed Sep. 6, 1989, Ser. No. 403,421

Claims priority, application Fed. Rep. of Germany, Dec. 30, 1988, 3844354

Int. Cl.[5] G01F *1/68*

U.S. Cl. 73—204.22 **15 Claims**



1. A meter for measuring the flow rate of a flowing medium, in particular for measuring the flow rate of aspirated air in an internal combustion engine in a flow area of a housing, said housing extending transversely to the flow direction, a ceramic substrate that is secured at one end to said housing and which includes a free end that protrudes therefrom and extends into said flow area with its free end having at least one temperature-dependent resistor film on at least one surface thereof said housing including a first half and a second half, the fixed end of said substrate extends in a dividing plane between said first housing half and said second housing half, in which said fixed end (8) of the ceramic substrate (7) is affixed to said first housing half (2), and a reinforcing element (15) in said first housing half extends into the flow area in a direction of said free end of said ceramic substrate underneath a portion of said ceramic substrate (7) to support a portion of said ceramic substrate which portion is affixed to said reinforcing element.

4,976,146

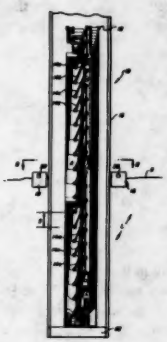
LIQUID LEVEL MEASURING APPARATUS

Karl A. Senghaas, 434 Forrest Hill, and Peter Senghaas, 334 Olney, both of San Antonio, Tex. 78209

Continuation of Ser. No. 260,084, Oct. 19, 1988, abandoned. This applicatioa Mar. 30, 1990, Ser. No. 501,407

Int. Cl.[5] G01F *23/62, 23/72;* H01H *35/18*

U.S. Cl. 73—313 **6 Claims**



1. A liquid level measuring apparatus comprising:

a plurality of spaced reed switches vertically aligned for positioning in a liquid, each reed switch vertically overlapping the adjacent above and below reed switches, the longitudinal axis of said reed switches being at an angle to the vertical,

a float carrying magnetic means movably positioned coaxially about said plurality of switches, the magnetic polarity of said magnetic means being vertically aligned, the magnetic means having a magnetic field in which the vertical strength is effective for sequentially and alternately actuating only one and then two switches as the float movers relative to the switches without actuating any other switches, said magnetic field is oriented relative to the reed switches and at a distance from the switches to provide a single defined actuation of each switch as the magnetic means moves relative to the switches,

a digital driver circuit connected to each reed switch, and

electrical indicating means, connected to said digital driver circuits, for indicating a vertical position of the float relative to said switches,

wherein said reed switches, said magnetic means and said indicating means are configured so that said indicating means has a resolution corresponding to a half of the distance between said spaced reed switches.

4,976,147

DEVICE FOR MEASURING DYNAMIC BALANCE OF A ROTOR

Mikiyoshi Okochi, and Tetsuo Oshiro, both of Nagoya, Japan, assignors to NGK Spark Plug Co., Ltd., Aichi, Japan

Filed Jun. 7, 1989, Ser. No. 362,844

Int. Cl.[5] G01M *1/04*

U.S. Cl. 73—455 **1 Claim**

1. A device for measuring dynamic balance of a rotor including a shaft, and an impeller secured to one end of the shaft, the shaft having a neck portion adjacent to the impeller so that the shaft may be rotatably supported by a bearing member at the neck portion, said device comprising:

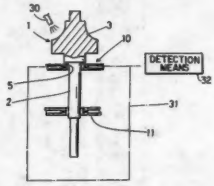
a housing member;

a thrust bearing secured to said housing member and supportingly engageable with the neck portion of the shaft;

a support member provided in the housing member beneath

said thrust bearing and engageable with the shaft so that the shaft may be rotatably supported in a slanted or a vertical position by said support member and said thrust bearing with the one end thereof t which the impeller is secured being positioned upward;

means connected to said housing member for detecting the vibration of said housing member, whereby when the rotor, supported by said thrust bearing and said support member, is rotated, the dynamic balance thereof can be measured by said detecting means the amount of the vibration of the housing caused by the rotation of the rotor;



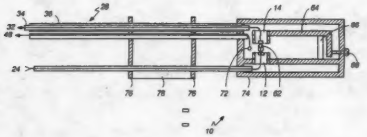
said thrust bearing and said support member being a pair of vertically spaced apart gas bearings, each including a bearing body supported by said housing and having a bore portion through which the shaft can be inserted, and a plurality of gas injection ports provided in the inside periphery of the bore portion for radially inwardly jetting a gas so that the rotor can be rotatably supported in a vertical position by the jet gas from said gas bearings without direct contact with said bearing bodies.

4,976,148

RESONANT ULTRASOUND SPECTROMETER

Albert Migliori, Santa Fe; William M. Visscher, Los Alamos, and Zachary Fisk, Santa Fe, all of N. Mex., assignors to The United Stated of America as represented by the Department of Energy, Washington, D.C.

Filed Sep. 12, 1989, Ser. No. 406,007
Int. Cl.[5] G01N *29/12*
U.S. Cl. 73—579 **8 Claims**



1. An ultrasound resonant spectrometer for use with a rectangular parallelepiped sample of a high dissipation material having an expected resonant response frequency range, comprising:

a sample holder structure for contacting corner portions of said sample;

a drive transducer assembly and a receive transducer assembly mounted on said holder for contacting said sample corner portions;

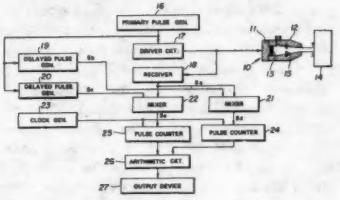
said drive and receive transducer assemblies including a piezoelectric transducer mounted on a membrane for weakly coupling said transducer to said sample holder structure and operatively contacting a material effective to remove system resonant responses at said transducer from said expected sample resonant response frequency range, effectively exciting an output response of said sample from said receive transducer assembly as said drive transducer assembly excites said sample over said expected resonant response frequency range.

4,976,149

ULTRASONIC DISTANCE SENSOR AND MONITORING OF SURFACE PROFILE UTILIZING ULTRASONIC DISTANCE SENSOR

Fumihiko Ichikawa, and Toshio Ohki, both of Chiba, Japan, assignors to Kawasaki Steel Corporation, Hyogo, Japan

Continuation of Ser. No. 827,954, Feb. 7, 1986, abandoned. This application Jun. 8, 1989, Ser. No. 364,573
Claims priority, application Japan, Oct. 21, 1985, 60-233396
Int. Cl.[5] G01N *29/00*
U.S. Cl. 73—597 **57 Claims**



1. A system for monitoring a surface condition of an object comprising:

a base having a reference surface;

a support means for supporting said object relative to said reference surface;

a housing defining an internal space therein, said internal space having an opening end opposing said object;

a liquid state ultrasonic wave transfer medium supply means connected to said housing to supply a pressurized liquid state ultrasonic wave transfer medium to be discharged from said opening end toward said object;

a surface scanning means, disposed within said internal space of said housing, for transmitting ultrasonic waves through said opening end towards various measuring points on the surface of said object and receiving the ultrasonic waves reflected from each of said measuring points on said surface of said object, and measuring the reflection elapsed time between transmission of said ultrasonic waves and reception of the reflected ultrasonic waves, and deriving from said reflection elapsed time a distance indicative time value with respect to each of the said measuring points;

a first correction means associated with said housing for deriving the propagation velocity of ultrasonic waves reflected off a surface of said correction means and thus deriving a propagation-velocity-dependent first correction value for correcting said distance indicative time value;

an arithmetic means connected to said surface scanning means for deriving the distance between each of said measuring points on said surface of said object and said scanning means on the basis of said distance indicative time value and said correction value; and

a display unit connected to said arithmetic means and adapted to display the resultant data derived from the distance derived by said arithmetic means.

4,976,150

ULTRASONIC TRANSDUCERS

Mitrajyoti Deka, Bethlehem, Pa., assignor to Bethlehem Steel Corporation

Continuation of Ser. No. 947,790, Dec. 30, 1986, abandoned. This application Jun. 2, 1989, Ser. No. 361,679
Int. Cl.[5] G01N *29/00*
U.S. Cl. 73—644 **9 Claims**

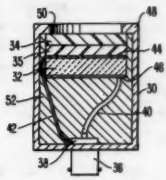
1. A transducer assembly for use in a non-contact system for measurement of properties and detection of imperfections of the internal portion of materials including:

(a) a layer of piezoelectric material having the capability of

transforming electrical energy into ultrasonic energy at a resonant frequency of the transducer assembly;

(b) a first matching layer of one quarter wavelength bonded to said piezoelectric layer; said first matching layer simulating an intermediate impedance;

(c) a second matching layer composed of a closed gas cell foamed material, said second matching layer sized at one quarter wavelength layer and bonded to the side of said first matching layer further from said piezoelectric layer, the gas cells of said foam being uniformly distributed throughout said second matching layer and very much



smaller than the wavelength of the ultrasound energy, said second matching layer matching the simulated impedance of said first matching layer to the impedance of air for optimizing the coupling efficiency of said ultrasound energy into ambient air and airborne ultrasound adapted to be emitted from said materials from ambient air; and

(d) said layer of piezoelectric material sized dimensionally in relation to said first and second impedance matching layers so that one of the radial modes of vibration of said layer of piezoelectric material overlaps the thickness resonance of the composite of said first and second impedance matching layers.

4,976,151

METHOD AND DEVICE FOR DETECTING BLOCKED CONDITION IN A TUBE OF A LIQUID INFUSION PUMP

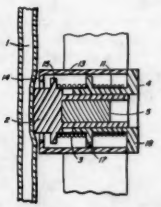
Masakazu Morishita, Wakayama, Japan, assignor to Sharp Kabushiki Kaisha, Osaka, Japan

Continuation-in-part of Ser. No. 351,270, May 11, 1989, abandoned, which is a continuation of Ser. No. 154,052, Feb. 9, 1988, abandoned. This application Mar. 15, 1990, Ser. No. 494,838

Claims priority, application Japan, Feb. 17, 1987, 62-22504

Int. Cl.[5] G01L *9/10*

U.S. Cl. 73—730 **8 Claims**



1. A detector for a blocked condition in a tube of a liquid infusion pump comprising

a tubular member, having a center flange and a back flange,

a shaft having one end in contact with the outer wall of a flexible tube for transporting a liquid therethrough by a liquid infusion pump, said shaft having a front flange and being slidably movable through said tubular member, said tubular member being secured so as to remain stationary independently of the motion of said shaft,

a magnet core affixed to said shaft,

a solenoid coil disposed around said tubular member and secured to and extending between said center flange and said back flange, said magnet core being sufficiently near said coil such that the inductance of said coil is affected by said magnet core, the inductance of said coil changing by a movement of said magnet core,

a coil spring disposed around said shaft and secured to and compressed between said center flange of said tubular member and said front flange of said shaft, and

a cover piece attached to said back flange of said tubular member and substantially entirely enclosing said tubular member, said cover piece having an inwardly protruding flange serving as a stopper for said flexible tube,

said detector being capable of detecting a blocked condition in said flexible tube by detecting a change in the inductance of said coil.

4,976,152

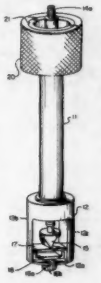
3 POINT BENDING MEASURING SYSTEM

Kerry McKinley, Danbury, Conn., and Benjamin Twombly, Basking Ridge, N.J., assignors to The Perkin Elmer Corporation, Norwalk, Conn.

Filed Nov. 13, 1989, Ser. No. 435,114

Int. Cl.[5] G01N *3/20*

U.S. Cl. 73—852 **5 Claims**



1. A sample holder for use with a bending-measuring system, comprising:

a sample container comprising two arms;

a plate supported by said two arms forming the bottom of said sample container;

said two arms forming access windows into said sample container;

a probe shaft rotatable about its axis having one end disposed in said sample container and the other end fixed to the bending-measuring system;

a probe tip removably fixed to said one end of said probe shaft disposed in said sample container;

a platform fixed to said sample container supporting said sample at two regions;

said probe tip holding said sample against and central to said two points of said platform;

a slot in said plate;

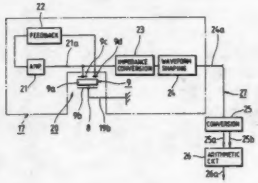
a threaded screw fixed to said platform disposed in said slot such that said screw and said platform are radially moveable relative to said plate and said probe tip; and

nut means adapted to be tightened on said screw to hold said platform fixed relative to said plate and probe tip at a desired position.

4,976,153
KARMAN VORTEX FLOW METER

Mutsumi Nagumo; Wataru Nakagawa, and Michihiko Tsuruoka, all of Kanagawa, Japan, assignors to Fuji Electric Co., Ltd., Kanagawa, Japan

Filed Oct. 26, 1988, Ser. No. 262,647
Claims priority, application Japan, Oct. 27, 1987, 62-271342; Oct. 27, 1987, 62-271343
Int. Cl.[5] G01F 1/32, 1/86
U.S. Cl. 73—861.03 6 Claims



1. A Karman vortex flow meter for detecting a flow rate of fluid from the frequency of vortex formation comprising:

a Karman vortex forming means inserted into a stream of a fluid for forming vortices near both sides thereof;

an oscillating means, inserted into the fluid, oscillating at a resonant frequency that varies with fluid density, for producing an oscillating signal;

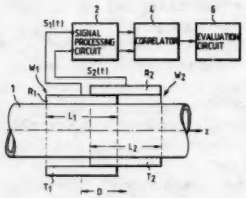
means for transmitting variations in pressure from the vortex forming means to the oscillating means whereby changes in pressure caused by vortex formation induce a change in density near the oscillating means, thereby modulating the frequency of the oscillating signal; and

means for detecting the frequency vortex formation including means for demodulating the oscillating signal thereby producing a signal whose frequency is indicative of the fluid flow rate.

4,976,154
ARRANGEMENT FOR CONTACTLESS MEASUREMENT OF THE VOLUME FLOW OR MASS FLOW OF A MOVING MEDIUM

Georg Schneider, Schopfheim-Langenau, and Hans Braun, Karlsruhe, both of Fed. Rep. of Germany, assignors to Endress u. Hauser GmbH u. Co., Fed. Rep. of Germany

Continuation-in-part of Ser. No. 825,077, Jan. 31, 1986, Pat. No. 4,708,021. This application Aug. 5, 1987, Ser. No. 81,985
Claims priority, application Fed. Rep. of Germany, Aug. 11, 1986, 3627162
The portion of the term of this patent subsequent to Nov. 24, 2004, has been disclaimed.
Int. Cl.[5] G01P 5/22
U.S. Cl. 73—861.06 9 Claims

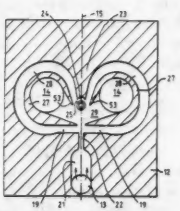


1. An arrangement for the contactless measurement of the mass or volume flow of inhomogeneities in a moving medium comprising two transducers having detection regions which are offset with respect to each other in the direction of movement of the medium and which generate electrical output signals influenced by the spatial position of inhomogeneities of the moving medium, the output signals generated in accordance with a spatial weighting function of each transducer, the detection regions of the two transducers partially overlapping in such a manner that the gradient of the spatial cross correlation function of the spatial weighting functions for the spatial displacement zero is different from the zero vector, means for calculating the time cross correlation function of the electrical output signals from the two transducers and for generating a first electrical signal representing the gradient of the time cross correlation function of the electrical output signals for the displacement time zero, means for processing the first electrical signal to generate a second electrical signal indicative of the mass or volume flow of the inhomogeneities in the moving medium, and means for coupling the means for generating the first electrical signal to the processing means.

4,976,155
FLUIDIC FLOWMETER

Claude Challandes, Sonceboz, Switzerland, assignor to Sontex, S.A., Sonceboz, Switzerland

PCT No. PCT/GB88/01057, § 371 Date Sep. 21, 1989, § 102(e) Date Sep. 21, 1989, PCT Pub. No. WO89/05441, PCT Pub. Date Jun. 15, 1989
PCT Filed Dec. 5, 1988, Ser. No. 411,460
Claims priority, application United Kingdom, Dec. 4, 1987, 8728468
Int. Cl.[5] G01F 1/20
U.S. Cl. 73—861.19 10 Claims



1. A fluid flowmeter comprising a chamber having a centreline (15), an inlet nozzle (22) directed along the centreline for the fluid whose flow is to be measured, a splitter (23) located on the centreline and having an apex (24) facing the nozzle, each side of the chamber on each side of a median plane including the centre line being divided into a feedback channel (28) and an outlet channel (29,14) with an apex (24) therebetween, the feedback channel (28) extending from the apex (24) of the splitter to a location (19) beside the mouth of the nozzle, characterised in that the distance (a) from the mouth of the nozzle (22) to the splitter (23) is greater than the distance (c) from the mouth of the nozzle to the apex (53) between the feedback channel and the outlet channel.

4,976,156
IMPULSE SENSOR WITH BALANCED MASS-STIFFNESS DISTRIBUTION

Hyok S. Lew, 7890 Oak St., Arvada, Colo. 80005

Filed Oct. 30, 1989, Ser. No. 429,155
Int. Cl.[5] G01F 1/32
U.S. Cl. 73—861.24 15 Claims

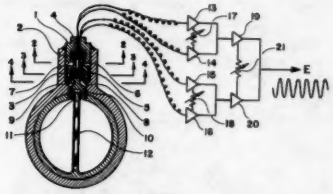
1. A device for sensing impulses comprising in combination:

(a) a transducer container vessel including a first and second stocky sections connected to one another by a midsection of a reduced cross section area;

(b) a first Piezo electric element disposed within a first cavity included in the first stocky section of the transducer con-

tainer vessel and pressed against a thin end wall of the first cavity adjacent to said midsection and perpendicular to the central axis of the transducer container vessel extending through the first and second stocky sections and said midsection of the transducer container vessel, wherein said first Piezo electric element includes at least two electrodes respectively disposed on the two opposite sides of a reference plane including said central axis of the transducer container vessel;

(c) a second Piezo electric element disposed within a second cavity included in the second stocky section of the transducer container vessel and pressed against a thin end wall of the second cavity perpendicular to said central axis, said thin end wall being a part of one end of the second stocky section opposite to said midsection of the transducer container vessel, wherein said second Piezo electric element includes at least two electrodes respectively disposed on the two opposite sides of said reference plane;



(d) a force transmitting member extending from said thin end wall of the second cavity in a direction generally parallel to said central axis; and

(e) a force receiving member disposed generally parallel to said reference plane and connected to the force transmitting member at one extremity and secured to a rigid structural member at a portion of the force receiving member away from said one extremity, wherein the first stocky section of the transducer container vessel is secured to the rigid structural member;

wherein two electrical signals respectively supplied by the two electrodes of the first Piezo electric element are combined to eliminate noise and obtain a first electrical signal representing forces experienced by said force receiving member, and two electrical signals respectively supplied by the two electrodes of the second Piezo electric element are combined to eliminate noise and obtain a second electrical signal representing forces experienced by said force receiving member, wherein said first and second electrical signals are combined to further eliminate noise.

4,976,157

FIBER OPTIC FLOW SENSOR

John W. Berthold, and Lawrence B. Thompson, both of Salem, Ohio, assignors to The Babcock & Wilcox Company, New Orleans, La.

Filed Nov. 8, 1989, Ser. No. 433,493
Int. Cl.[5] G01F *1/32*
U.S. Cl. 73—861.24 **11 Claims**

1. A fiber optic flow sensor, comprising:

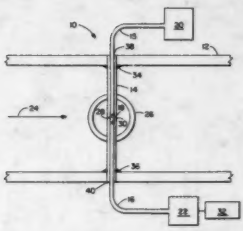
a conduit for conveying a fluid;

a first optical fiber having one end extending into said conduit and terminating therein;

a second optical fiber having one end extending into said conduit approximately opposite said first optical fiber and terminating therein, said first and second optical fibers being substantially in axial alignment within said conduit and substantially normal to said conduit with a gap separating the ends of said optical fibers;

means for holding both optical fibers securely within said conduit, said holding means being rigidly attached to said conduit in an orientation substantially normal thereto, said holding means having flexibility to deflect with fluid flow in said conduit, said holding means including an obstruction for restricting flow area;

a light source connected to the other end of said first optical fiber for transmitting light therethrough; and



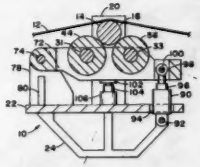
a light detector connected to the other end of said second optical fiber for measuring the transmitted light from said first optical fiber, whereby fluid flow in said conduit produces a deflection of said holding means which provides angularity between the ends of said optical fibers to attenuate the light transmitted in proportion to the fluid flow.

4,976,158

TENSION MEASURING APPARATUS

Vladimir B. Ginzburg, Pittsburgh, and Robert H. Ellis, Oakmont, both of Pa., assignors to United Engineering, Inc., Pittsburgh, Pa.

Filed May 8, 1989, Ser. No. 348,945
Int. Cl.[5] G01L *5/10*; B21C *51/00*
U.S. Cl. 73—862.07 **14 Claims**



1. Apparatus for measuring the distribution of tension in a traveling flat workpiece, comprising:

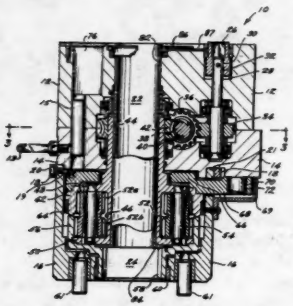
an elastically bendable roll having an axis and a continuous peripheral surface for continuously engaging the width of a traveling flat workpiece, the roll being supported by at least two segmented rolls, each segmented roll having roll segments operatively engaged with the peripheral surface of the supported roll, at least one roll segment of each segmented roll being supported by a moveable support member, whereby the supported roll elastically bends along its axis under the tension of the workpiece and thereby exerts loads upon the roll segments of the segmented rolls which are supported by the moveable support member; and

sensing means operatively connected with the moveable support member for sensing the tension in the traveling flat workpiece.

4,976,159
DUAL MODE TORQUE WRENCH

Robert F. Snyder, Hamden; John H. Ferguson, Rocky Hill; Jesse R. Meisterling, East Hampton, and David S. Fishman, West Hartford, all of Conn., assignors to Raymond Engineering Inc., Middletown, Conn.

Filed Oct. 11, 1989, Ser. No. 419,682
Int. Cl.[5] B25B *23/142*; G01L *5/24*
U.S. Cl. 73—862.21 18 Claims



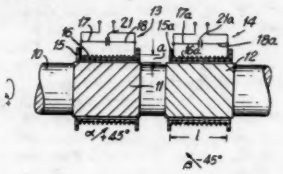
1. A torque wrench including:
housing means;
gear train means within and supported by said housing means for providing multiplication of an input to the torque wrench;
input means connected to said gear train means to deliver an input to the torque wrench;
output means connected to a part of said gear train means for delivering a torque load to an item to be torqued;
first reaction means associated with a first part of said housing means for connecting the torque wrench to a reaction surface in a first mode of operation of the torque wrench;
second reaction means associated with a second part of said housing means for connecting the torque wrench to a reaction surface in a second mode of operation of the torque wrench;
said first and second modes of operation being mutually exclusive;
said second reaction means including a passage through said output means and through the torque wrench; and
reaction measuring means connected to said part of said gear train means for measuring the torque load delivered to an item to be torqued.

4,976,160
PROCESS FOR CONTACTLESS MEASUREMENT OF MECHANICAL STRESS AND DEVICE FOR CARRYING OUT THE SAME

Klaus Dobler, Gerlingen; Hansjörg Hachtel, Weissach, and Georg Zimmermann, Gerlingen, all of Fed. Rep. of Germany, assignors to Robert Bosch GmbH, Stuttgart, Fed. Rep. of Germany

PCT No. PCT/DE87/00258, § 371 Date Jan. 20, 1989, § 102(e) Date Jan. 20, 1989, PCT Pub. No. WO88/00690, PCT Pub. Date Jan. 28, 1988
PCT Filed Jun. 5, 1987, Ser. No. 314,575
Claims priority, application Fed. Rep. of Germany, Jul. 23, 1986, 3624846
Int. Cl.[5] G01L *3/10*
U.S. Cl. 74—862.36 18 Claims

1. Device for contactless measurement of mechanical stresses which are exerted on a rotating or stationary object to be measured, comprising at least two regions on the surface of the object (10) to be measured which comprise a coating of a magnetoelastically sensitive material whose permeability changes as a function of stress, and at least one sensor arrangement (13, 14) assigned to each of these regions (11, 12), each sensor arrangement (13, 14) including a parallel resonant circuit having a coil and a capacitor, an oscillator (25 for energizing said parallel resonant circuits to induce alternating magnetic fields in respective coils, said coatings being applied

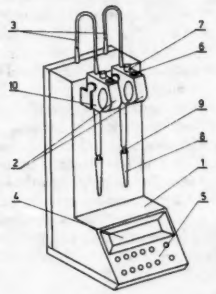


without prestressing and each having a grooved pattern which is oriented at $+45°$ and $-45°$ relative to an object axis respectively, and an electric evaluating circuit (22) for evaluating signals across said resonant circuits to produce an output voltage (U_M) which is a measure of the mechanical stress exerted on said object.

4,976,161
FLUID DISPENSING DEVICE

Andrzej Czernecki, and Piotr Cippert, both of Warsaw, Poland, assignors to Przedsiebiorstwo Polonijno-Zagraniczne Plastomed, Poland

Filed Apr. 13, 1989, Ser. No. 337,576
Claims priority, application Poland, Apr. 15, 1988, 271846
Int. Cl.[5] B01L *3/02*
U.S. Cl. 73—864.17 2 Claims

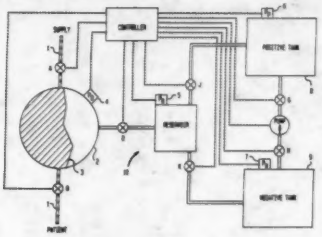


1. A fluid dispensing device comprising a control unit with a programmable electronic circuit, a keyboard and a display, a drive unit with a motor and a shaft, piston-cylinder units, each having a piston and a cylinder, and pipettes each comprising a measuring tip, a clamping sleeve and an ejector's unit, the measuring tip being releasable from the clamping sleeve by the ejector's unit and a switch-key, wherein the pipettes are connected by means of electric conduits to the control unit and by means of a pneumatic conduit each to a piston-cylinder unit respectively, wherein the control unit, the drive unit and the piston-cylinder units are placed into a separate housing, the shaft of the motor is connected by means of a connector to said pistons, and said cylilnders are connected to a corresponding pipette by means of a flexible electro-pneumatic conduit, wherein the electric conduit and the pneumatic conduit are placed into a common casing, wherein said programmable electronic circuit is provided with a temperature compensation system together with temperature-sensitive elements, one of them being seated inside the housing, near to one said piston.

4,976,162
ENHANCED PRESSURE MEASUREMENT FLOW CONTROL SYSTEM

Dean L. Kamen, 44 Gage Rd., Bedford, N.H. 03102

Continuation-in-part of Ser. No. 92,481, Sep. 3, 1987, Pat. No. 4,826,482, which is a continuation-in-part of Ser. No. 22,167, Mar. 5, 1987, Pat. No. 4,808,161, which is a continuation-in-part of Ser. No. 836,023, Mar. 4, 1986, Pat. No. 4,778,451. This application May 1, 1989, Ser. No. 345,387
Int. Cl.[5] G01F *17/00*
U.S. Cl. 73—865.9 8 Claims



1. A system for measuring in an isolated rigid container partially filled with a fluid, the volume, Vu of that portion of the container that is not occupied by the fluid, such portion being called the unoccupied portion, the system comprising:

reservoir means for holding a fixed, known volume, Vr, of a measurement gas;

pressure means for (i) permitting the measurement gas to fill the unoccupied portion of the container, so that the measurement gas is in fluid communication with the fluid in the container, (ii) in a first valve position, permitting the measurement gas to flow between the container and the reservoir means, and, in a second valve position, preventing the measurement gas from flowing between the container and the reservoir means, and (iii) upon activation, changing the pressure in the reservoir means by changing the amount of measurement gas in the reservoir means;

transducer means for measuring the pressure in the reservoir means; and

control means for (i) reading pressure measurements from the transducer means, (ii) putting the pressure means into the first or second valve position (iii) activating the pressure means to change the pressure in the reservoir means, and (iv) calculating, based on the pressure measurements and the volume, Vr, of the reservoir means, the volume, Vu, of that portion of the partially filled container that is not occupied by the liquid.

4,976,163
REACTIONLESS ACTUATOR-GIMBAL SYSTEM

Larry Schumacher, 18876 Tenderfoot Trail, Newhall, Calif. 91321

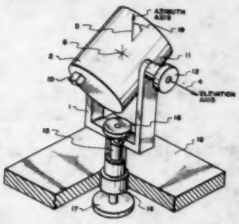
Filed Oct. 2, 1989, Ser. No. 415,703
Int. Cl.[5] G01C *19/30*
U.S. Cl. 74—5.47 4 Claims

1. A reactionless actuator-gimbal system of the type having two rotational axes approximately through a payload mass center comprising:

a. a gimbal structure rotationally supporting the payload relative a support structure;

b. an azimuth reactionless actuator torquing the gimbal structure and the payoad around an azimuth axis approximately orthogonal to the support structure, the azimuth reactionless actuator having an azimuth motor stator and the gimbal structure attached to an azimuth harmonic drive flex spline, an azimuth motor rotor and an azimuth constant inertia flywheel attached to an azimuth harmonic drive wave generator, the support structurw attached to an azimuth harmonic drive circular spline, the azimuth reactionless actuator maintaining a ratio of the gimbal structure azimuth rate to azimuth constant inertia flywheel flywheel rate a negative constant with non acceleration torques acting on the gimbal structure cancelled by torque resulting from the intersection of the azimuth harmonic drive circular spline, the azimuth wave generator and the azimuth flexspline;

c. an elevation reactionless actuator torquing the payload around an elevation axis approximately orthogonal to the azimuth axis, the elevation reactionless actuator having an elevation motor stator and the payload attached to an elevation harmonic drive flex spline, an elevation motor rotor and an elevation constant inertia flywheel attached to an elevation harmonic drive wave generator, and the



gimbal structure attached to an elevation harmonic drive circular spline, the elevation reactionless actuator maintaining a ratio of the payload elevation rate to the elevation constant inertia flywheel rate a negative constant with payload elevation non acceleration torques cancelled by torques resulting from an interaction of the elevation harmonic drive circular spline, the elevation harmonic drive wave generator and the elevation harmonic drive flexspline;

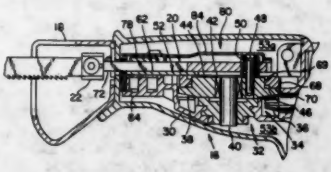
d. a reaction wheel attached to the gimbal structure with a reaction wheel flywheel rotational axis approximately parallel to the azimuth axis

e. a reaction wheel control means controlling a combined azimuth angular momentum of the reaction wheel, the gimbal structure, the payload and the constant inertia azimuth flywheel to approximate zero.

4,976,164
THRUST BEARING ARRANGEMENT FOR A POWER TOOL TRANSMISSION

Lynn E. Lentino, Westminster, Md., assignor to Black & Decker Inc., Newark, Del.

Filed Nov. 14, 1988, Ser. No. 270,726
Int. Cl.[5] B27B *11/02*
U.S. Cl. 74—50 31 Claims



1. In the mechanical transmission of a power tool, the transmission having a housing and an internal dividing wall defining first and second spaces within the housing, and including a plurality of drivably movable components within the housing.

each space containing at least one of the movable components and including a speed reducing bevel gear set having an output crown wheel which, in operation, receives a thrust load from an input pinion, the crown wheel having a toothed face and an opposite back face and an axis of rotation, the gear set being contained entirely in the first space and the crown wheel drivably communicating with at least one component in the second space, a bearing arrangement for the crown wheel comprising:

a thrust bearing surface on the dividing wall, facing into the first space, opposite the back face of the crown wheel and perpendicular to the axis of rotation of the crown wheel;

radial bearing means extending only in the first space, journaling the crown wheel for rotation on the axis of rotation; and

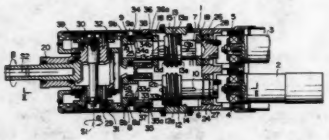
thrust bearing means effective between the thrust bearing surface and the back face of the crown wheel, so that, in operation, thrust loads from the crown wheel are absorbed by the dividing wall.

4,976,165

BACKLASH REMOVING MECHANISM FOR INDUSTRIAL ROBOT

Yasuhide Nagahama, Kamakura, Japan, assignor to Kabushiki Kaisha Kobe Seiko Sho, Kobe, Japan

Filed Jul. 14, 1989, Ser. No. 379,959
Int. Cl.[5] B25J *17/02*; F16H *35/08, 55/20*
U.S. Cl. 74—400 **3 Claims**



1. A backlash removing mechanism for an industrial robot, comprising:

a casing;

a rotational driving means disposed in said casing;

a reduction gear for reducing the speed of rotation of said rotational driving means;

a rotary shaft directly coupled at an end thereof to the output side of said reduction gear, said reduction gear being disposed for movement in a direction of an axis of said rotary shaft;

a gear mechanism provided at the other end of said rotary shaft for transmitting rotation of the reduced speed from said reduction gear to an output power shaft of said robot;

a first bearing for supporting said rotary shaft for rotation thereon, said first bearing being slidably disposed on said casing for integral movement with said rotary shaft in the direction of the axis of said rotary shaft;

a second bearing fitted on said shaft; and

positioning means for adjustably and securely positioning said second bearing in the direction of the axis of said rotary shaft on said casing.

4,976,166

ELECTRONIC FOOT PEDAL

Jeffrey L. Davis, Tigard, and Jay D. Byler, Beaverton, both of Oreg., assignors to Dana Corporation, Toledo, Ohio

Filed Dec. 28, 1988, Ser. No. 290,980
Int. Cl.[5] G05G *1/14*; H01C *10/00*
U.S. Cl. 74—512 **2 Claims**

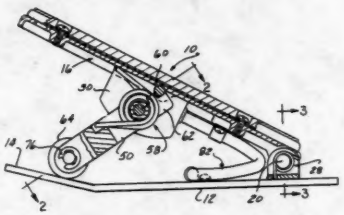
1. A foot pedal assembly for generating an electrical signal which is representative of the angular position of a pedal comprising:

a base having a track;

a pedal having upper and lower sides, said pedal pivotally mounted above said base and adapted to be pivoted toward and away from said track;

a lever arm having upper and lower ends, the upper end pivotably mounted on the lower side of said pedal, said lever arm including a bearing means at the lower end of the lever arm, said bearing means engaging said track and being forced to move between a depressed and an idle position along said track upon respective pivotal movement of the pedal toward and away from said track;

a potentiometer carried on one of said lever arm and pedal which is responsive to the relative pivoting movement therebetween for generating an electrical signal representative of the angular position of said pedal;



spring biasing means biasing said lever arm toward the idle position, said spring biasing means having a pre-loaded condition in said idle position, and a stop member mounted on said pedal for engaging the lever arm and stopping the spring biasing movement of the lever arm at said idle position, said stop member being removably mounted to said pedal whereby the lever arm and spring biasing means can be mounted to said pedal with the stop member removed and with the spring biasing means in an unloaded condition to be thereafter pivoted past the idle position and toward said depressed position for mounting the stop member to the pedal.

4,976,167

TILT-TELESCOPE STEERING COLUMN

Frederick D. Venable, Lafayette, and Bernard C. Hudgens, West Lafayette, both of Ind., assignors to TRW Inc., Lyndhurst, Ohio

Filed Nov. 29, 1988, Ser. No. 277,232
Int. Cl.[5] G05G *5/18*; B62D *1/18*
U.S. Cl. 74—533 **4 Claims**

1. An apparatus comprising:

a first member;

a second member supported by said first member for pivotal movement relative thereto;

a lock member carried by said second member, said lock member being movable along a path toward and away from said first member;

a plurality of notches located on one of said first member and said lock member;

a projection located on the other of said first member and said lock member for entering one of said plurality of notches and for engaging a surface defining said one notch to block relative pivotal movement between said first member and said second member;

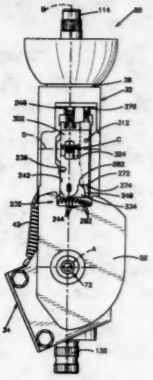
means for moving said lock member in a direction transverse to the path of movement of said lock member to engage a surface of said second member and to maintain said lock member in engagement with the surface of said second member after said projection engages said surface defining said one notch;

said means for moving said lock member in a direction transverse to the path of movement of said lock member including a surface located on said lock member extending transversely relative to the path of movement of said lock

member and a wedge member located adjacent said lock member and having a surface extending transversely relative to the path of movement of said lock member, said wedge member being movable in a direction substantially parallel to the path of movement of said lock member to a position in which said surface on said wedge member engages said surface on said lock member to urge said lock member to move in the transverse direction to engage the surface of said second member; and

means for moving said wedge member in a direction away from said first member before moving said lock member in the direction away from said first member and comprising:

an actuator member located adjacent said wedge member and said lock member;



a pin extending from said lock member; and

surface means defining an elongate slot in said actuator member and having a longitudinal central axis extending in a direction parallel to the path of movement of said lock member;

said actuator member being connected to said wedge member for joint movement and said pin on said lock member extending into the elongate slot in said actuator member at a location so that said wedge member and said actuator member move a predetermined amount in a direction away from said first member before said pin engages an axial end surface of the elongate slot in said actuator to move said lock member away from said first member.

4,976,168

DRIVE FOR A DOOR OPERATOR

Lucio Lotznicker, 37 Balmoral Drive, Parkdale, Victoria, 3195; Raymond R. Hawkins, 25 Holbourne Drive, Cranbourne, Victoria, 3977; George Karban, 93 Haverbrack Drive, Mulgrave, Victoria, 3170; Simon Leivenzon, 16 Olinda Street, and Zvi Leivenzon, 22 Trevescus Street, both of Caulfield South, Victoria, 3162, all of Australia

PCT No. PCT/AU87/00436, § 371 Date Jun. 22, 1989, § 102(e) Date Jun. 22, 1989, PCT Pub. No. WO88/04716, PCT Pub. Date Jun. 30, 1988

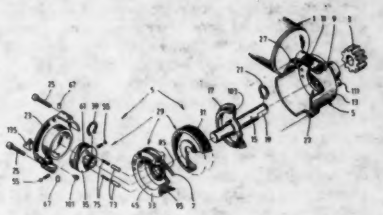
PCT Filed Dec. 21, 1987, Ser. No. 378,193

Claims priority, application Australia, Dec. 22, 1986, PH9615

Int. Cl.[5] F16H *1/16*

U.S. Cl. 74—625 **11 Claims**

1. An improved drive comprising a motor means and a gear box means having an indexing drive disengaging means therein, said indexing drive disengaging means being operable to permit drive engagement of said drive gear box means with said motor means when indexed by movement in one direction and to permit drive disengagement of said drive gear box means with said motor means when next indexed by movement in the same direction, wherein rotating meshing drive members in said gear box means are relatively displaceable to each other along a central rotational axis of at least one of the rotating



meshing drive members, in order to cause drive disengagement.

4,976,169

METHOD OF CONTROLLING SPEED REDUCTION RATIO FOR A CONTINUOUSLY VARIABLE TRANSMISSIONS

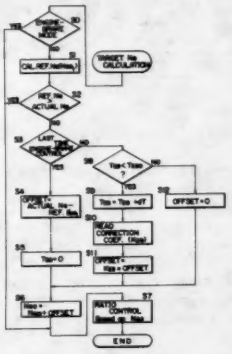
Koji Sasajima, Tokyo, and Yoshikazu Ishikawa, Saitama, both of Japan, assignors to Honda Giken Kogyo Kabushiki Kaisha, Tokyo, Japan

Filed Nov. 14, 1988, Ser. No. 270,538

Claims priority, application Japan, Nov. 16, 1987, 62-288942

Int. Cl.[5] B60K *41/12*

U.S. Cl. 74—866 **13 Claims**



1. A method of controlling speed reduction ratio in a continuously variable speed transmission comprising, a running mode control method which is carried out when an accelerator opening is opened to at least some extent and an engine brake mode control method which is carried out when said accelerator opening is substantially closed,

said running mode control method comprising, determining a R-REF reference engine speed corresponding to said accelerator opening and controlling the speed reduction ratio so that an actual engine speed coincides with said R-REF reference engine speed, and

said brake mode control method comprising, determining an EB-REF reference engine speed corresponding to a vehicle speed and controlling the speed reduction ratio so that the actual engine speed coincides with said EB-REF reference engine speed,

said method of controlling speed reduction ratio further comprising a transient control method which is carried out over a predetermined period of time when the control

is shifted from a state under said engine brake mode control to a state under said running mode control,

said transient control method comprising, obtaining a corrected R-REF reference engine speed immediately after the shift from the engine brake mode control to the running mode control, by adding a correction to said R-REF reference engine speed set corresponding to a current accelerator opening, said correction being a speed difference between a first reference engine speed and said R-REF engine speed,

obtaining a further corrected R-REF engine speed during said predetermined period of time following said shift, by adding instead a correction, which is obtained by gradually decreasing said speed difference with time, to the R-REF engine speed set corresponding to the current accelerator opening, and

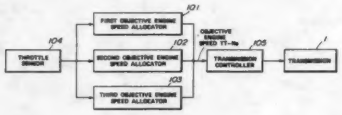
controlling the speed reduction ratio so that the actual engine speed coincides with said corrected R-REF engine speed over said predetermined period of time.

4,976,170

METHOD FOR CONTROLLING STEPLESS AUTOMATIC TRANSMISSION AND APPARATUS THEREFOR

Kiyotaka Hayashi; Etsumi Handa; Yorihisa Yamamoto, and Hiroshi Tanaka, all of Saitama, Japan, assignors to Honda Giken Kabushiki Kaisha, Tokyo, Japan

Filed Aug. 10, 1988, Ser. No. 230,840
Claims priority, application Japan, Aug. 11, 1987, 62-200582
Int. Cl.[5] B60K *41/12*
U.S. Cl. 74—866 **4 Claims**



1. An apparatus for controlling a stepless automatic transmission of a vehicle which comprises:

(a) a throttle sensor for sensing a change with respect to time of a throttle aperture;

(b) a first objective engine speed allocator for allocating an objective engine speed in a condition that the change with respect to time of the throttle aperture is within a prescribed range;

(c) a second objective engine speed allocator for allocating an objective engine speed in a condition that the throttle aperture is opened more rapidly than a first prescribed value;

(d) a third objective engine speed allocator for allocating an objective engine speed in a condition that the throttle aperture is closed more rapidly than a second prescribed value; and

(e) a transmission controller for controlling an oil distributor to control a transmission ratio of the stepless automatic transmission so that an actual engine speed coincides with the objective engine speed.

4,976,171

TRANSMISSION SHIFTER TO OPERATOR CONTROLLED MECHANISM INTERLOCK

Harold L. Sharp, Union Lake, and Charles E. Kinkade, Dryden, both of Mich., assignors to General Motors Corporation, Detroit, Mich.

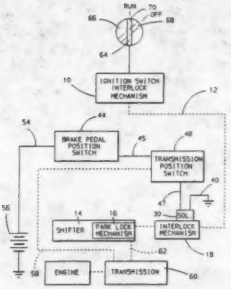
Filed Oct. 10, 1989, Ser. No. 419,307
Int. Cl.[5] B60R *41/04*
U.S. Cl. 74—878 **11 Claims**

1. A control for shifting an automatic transmission which requires at least one operator controlled mechanism to be manipulated prior to the transmission being shifted from a nondrive range to a drive range comprising:

position selector means movable to control setting of said transmission;

cable means attached on one end to said position selector;

lock means operatively connected with said cable means and further comprising a toothed rack fixed to said cable having a plurality of teeth oriented perpendicular to a longitudinal axis of said cable and a pawl disposed for



engagement with said teeth of said toothed rack by moving perpendicular to said axis of said cable;

said lock means being engaged to fix said cable means, thereby fixing said position selector means, when said transmission is in said nondrive range prior to manipulation of said operator controlled mechanism; and

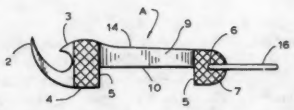
control means for actuating said lock means.

4,976,172

BOTTLE OPENER WITH KEY RING

Orrett H. Thomas, and Leonora Thomas, both of 115 Lenox Rd., Apt. E6, Brooklyn, N.Y. 11226

Filed Jul. 27, 1989, Ser. No. 363,719
Int. Cl.[5] B67B *7/44*
U.S. Cl. 81—3.09 **8 Claims**



1. A bottle cap opener which comprises:

(a) first and second ends connected by a middle body portion, said middle body portion having a flat surface with two opposite concave edges delimited by outwardly facing concave sides;

(b) means at said first end for gripping and lifting a bottle cap;

(c) a recessed area delimited by a flat surface of said body portion and at least two mutually facing curved walls for gripping a bottle cap inserted therebetween, said curved walls being positioned relative to said outwardly facing concave sides of the middle body portion to facilitate removal of said bottle cap from between said curved walls.

4,976,173
MANUAL ELECTRIC TOOL

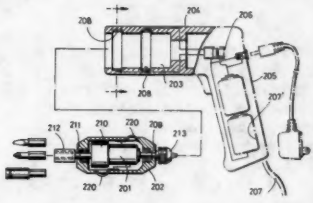
Tai-Her Yang, 5-1 Taipin Street, Si-Hu Town, Dzan-Hwa, Taiwan

Continuation-in-part of Ser. No. 270,466, Nov. 9, 1988, abandoned, which is a continuation of Ser. No. 156,027, Feb. 16, 1988, abandoned. This application Jul. 27, 1989, Ser. No. 385,454

Claims priority, application United Kingdom, Feb. 24, 1987, 8704265

Int. Cl.[5] B25B *21/00*

U.S. Cl. 81—54 13 Claims



1. An electric tool comprising a housing including a handle, the housing having a forwardly-opening socket formed therein, a first pair of spaced-apart electrical contacts carried by the housing and accessible internally of the socket, means within the handle for connecting the first pair of contacts with a source of electrical energy, a power unit adapted to be received within the socket and retained within the housing, a second pair of spaced-apart electrical contacts carried by the power unit and adapted to engage the first pair of spaced-apart electrical contacts when the power unit is inserted into the socket in the housing, a motor in the power unit and connected to the source of electrical energy through the engaging first and second pairs of electrical contacts, respectively, a shaft diven by the motor and having a portion thereof protruding beyond the power unit, means carried by the protruding portion of the shaft to receive a tool implement, and speed-reduction gearing between the motor and the protruding portion of the shaft.

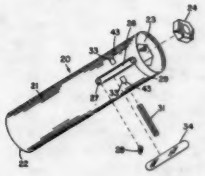
4,976,174
SOCKET WRENCH ATTACHMENT WITH REMOVABLE RETAINING MEANS

Arthur Walsh, 143 Salmon Falls Rd., Rochester, N.H. 03867

Continuation of Ser. No. 384,688, Jul. 25, 1989, abandoned, which is a continuation of Ser. No. 157,874, Feb. 19, 1988, abandoned. This application Dec. 5, 1989, Ser. No. 446,080

Int. Cl.[5] B25B *13/02*

U.S. Cl. 81—125 1 Claim



1. An attachment for a socket wrench or like tool for engaging a part, said attachment comprising:

A. a cylindrical body having first and second axial end sections and an intermediate section therebetween, said first axial end section being adapted for engagement with the tool and said second axial end section having a part receiving means with an interior surface extending axially into said body from an end opening thereof, said body having an exterior surface coextensive with at least portions of said intermediate and second end sections and including:

i. an axially extending slot of predetermined dimensions formed in the exterior surface of said body and coextensive with portions of said intermediate and second end sections, said slot extending between a first, proximate end spaced from the end opening of said second section and a distal end having a bottom surface thereof,

ii. a transverse aperture extending through said body portion between said first end of said slot and said interior surface of said part receiving means,

iii. a traverse cavity formed in said body at said distal end of said slot, and

iv. an aperture through said body transverse to said slot, intermediate the length thereof and lying above the bottom of said slot;

B. a split compression pin of a predetermined diameter located in said aperture and traversing said slot;

C. a compression spring located in said cavity; and

D. an elongated rocker arm for being disposed in said slot and having:

i. parallel depending legs at an intermediate portion of said rocker arm spaced at a distance that is less than the predetermined diameter of said split compression pin for engaging said split compression pin and for enabling said rocker arm to pivot about said compression spring, said depending legs being opened at the ends thereby to define an opening that enables an individual to remove the rocker arm from said split compression pin,

ii. a distal end with respect to said second section of said body for engaging said spring thereby to pivot said distal end away from said body, and

iii. a finger depending from the end of said rocker arm proximate said second section, said finger being aligned with said transverse aperture at said proximate end of the slot, said finger having a camming surface formed at the end thereof and a parallel inner latching surface for overlapping the end of a part, said rocker arm being pivoted to compress said spring and release said part and said rocker and said spring being removable by an individual from said body thereby to minimize the cross-sectional profile of said attachment.

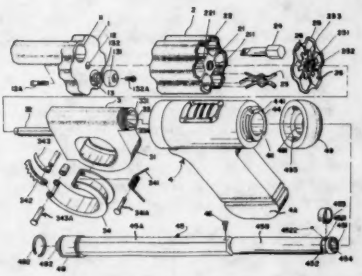
4,976,175
MULTIPURPOSE TOOL

Hsi-Chiang Hung, 2F, No. 19, Lane 284, Shiang Shang North Rd., West District Taichung, Taiwan

Filed Oct. 16, 1989, Ser. No. 421,957

Int. Cl.[5] B25B *23/00*

U.S. Cl. 81—439 6 Claims



1. A multipurpose tool comprising:

(a) a front barrel assembly including a first bore therethrough;

(b) a rear barrel assembly including a second bore therethrough;

(c) a revolver including a plurality of chambers for storing tool bits, the revolver being supported for rotation between the front and rear barrel assemblies;

(d) a trigger assembly carried by the rear barrel assembly for rotating the revolver and successively indexing each chamber into alignment with the first bore, which trigger assembly includes a hexagonal plate carried by the revolver, the plate being provided with a plurality of openings aligned with and corresponding to the configuration of the chambers and a plurality of ratchet tongues, a pivotal trigger, a ratchet plate carried by the trigger, and wherein upon pivotal movement of the trigger, the ratchet plate engages the ratchet tongues to rotate the revolver;

(e) a handle secured to the rear barrel assembly and including a third bore; and

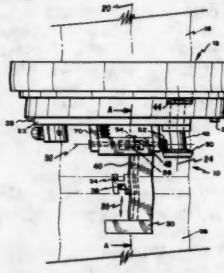
(f) an actuating shaft slidably supported within the first, second and third bores for sliding movement between a fully retracted position wherein the shaft is positioned within the first, second and third bores for maintaining a selected tool bit in a position of use at a forward end of the front barrel assembly, and a fully extended position wherein the shaft is positioned in the second and third bores to permit free rotation of the revolver upon actuation of the trigger means.

4,976,176

WELD CROWN REMOVAL MODULE

Jerald Vanderpol, Eldorado Hills, and William H. Astle, Rancho Cordova, both of Calif., assignors to Tri Tool Inc., Rancho Cordova, Calif.

Filed Aug. 14, 1989, Ser. No. 392,890
Int. Cl.[5] B23B 3/22
U.S. Cl. 82—113 10 Claims



1. A module for use with a portable lathe or the like to machine an area of a pipe or tube having a longitudinal axis to remove irregularities therefrom, the portable lathe having a rotatable portion rotatable around the longitudinal axis, the module comprising:

(a) a first tool support member attached to the rotatable portion of the portable lathe or the like such that the first tool support member pivots about a first pivot axis;

(b) a second tool support member attached to the first tool support member so as to pivot with respect thereto about a second pivot axis substantially perpendicular to the first pivot axis;

(c) means associated with the first and second tool support members to establish spaced apart reference points on opposite sides of the area to be machined;

(d) means to mount a cutting tool holder on the second tool support member;

(e) feed means associated with the cutting tool holder to move the tool holder along a path extending substantially parallel to a line connecting the spaced apart reference points; and

(f) drive means to drive the feed means as the rotatable portion of the portable lathe rotates comprising:

(i) a first drive means rotatable about a first rotational axis substantially coincident with the first pivot axis as the rotatable portion of the portable lathe rotates; and

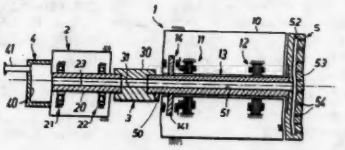
(ii) a second drive means drivingly engaged with the first drive means and the feed means, and rotatable about a second rotational axis substantially coincident with the second pivot axis.

4,976,177

WORKPIECE-CARRIER SPINDLE ASSEMBLY HAVING MAGNETIC BEARINGS, AND A DEVICE IMPLEMENTING SUCH AN ASSEMBLY FOR A VERY HIGH PRECISION MACHINE TOOL

Claude Fouche, Gasny, France, assignor to S.A.: Societe Europeenne de Propulsion, Suresnes, France

PCT No. PCT/FR87/00448, § 371 Date Aug. 31, 1988, § 102(e) Date Aug. 31, 1988, PCT Pub. No. WO88/03458, PCT Pub. Date May 19, 1988
PCT Filed Nov. 13, 1987, Ser. No. 221,252
Claims priority, application France, Nov. 13, 1986, 86 15762
The portion of the term of this patent subsequent to May 29, 2007, has been disclaimed.
Int. Cl.[5] B23B 19/02; F16C 32/04
U.S. Cl. 82—147 14 Claims



1. A workpiece-carrier spindle assembly having active magnetic bearings for a very high precision machine tool, the assembly comprising a stator mounted on a slide for guidance along a predetermined direction, a spindle mounted inside the stator, a chuck fixed to the spindle, first and second radial active bearings supporting the spindle and controlled from radial detectors for detecting the position of the rotor, an axial abutment constituted by an axial active magnetic bearing cooperating with a disk fixed to the spindle and controlled from at least one axial detector for detecting the position of the spindle, and an electric motor for rotating the spindle, wherein:

the electric motor is external to the spindle assembly stator, is disposed behind the spindle and substantially in alignment therewith,

the external motor has a smaller air gap than the air gap between the radial magnetic bearings and the spindle,

the rotary drive communicated to the spindle by the external motor expressed in revolutions per second (Hz) lies outside the servo-control passband of the magnetic suspension system expressed in hertz,

a flexible coupling device connects the outlet shaft of the external motor to the rear portion of the spindle while filtering mechanical disturbances due to the eccentricity of the motor, and

the spindle assembly further includes additional means for detecting movements of the spindle assembly guide slide and means for selectively modifying the electrical reference voltages of the servo-control loops of the axial bearing and of the radial bearings as a function of the signals from said additional detection means, said additional means for detecting movements of the slide on which the workpiece-carrier spindle assembly is placed including

two detectors in the servo-control plane of each of the radial bearings, said detectors being fixed to the spindle assembly stator and facing two plane reference surfaces disposed parallel to the displacement direction of said slide, said detectors delivering electrical signals proportional to variations in the distances between said detectors and said plane reference surfaces in order to control in real time the means for selectively modifying the reference voltages of the servo-control loops of the radial bearings of the workpiece-carrier spindle assembly as a function of said proximity variations between the detectors and the plane reference surfaces.

4,976,178

ANNULAR SCRAP SEGMENTS IN TIRE REDUCTION

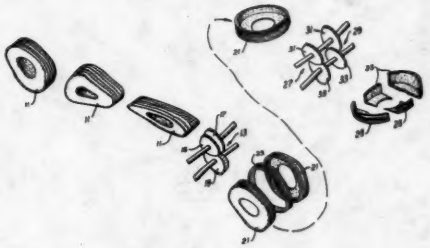
Randel L. Barclay, 5616 Carpenter Rd., Stockton, Calif. 95205

Filed Jul. 28, 1988, Ser. No. 225,908

The portion of the term of this patent subsequent to Jul. 28, 2004, has been disclaimed.

Int. Cl.[5] B02C *18/06*; B26D *1/24*

U.S. Cl. 83—19 **15 Claims**



14. A method of shearing automotive tires of the type having tread about a circumferential periphery and a center defining a tire axis, comprising,

compressing a tire by circumferential pressure thereby bringing opposed tread regions into proximity to elongate the tire,

advancing the compressed tire in a substantially straight-line fashion, and

shearing the compressed tire during straight-line advancement, said shearing being along the length of said compressed tire to form at least two annular tire sections.

4,976,179

METHOD OF PUNCHING BAR CODES IN A METAL STRIP

Joël G. Lacrouts-Cazenave, Neauphle Le Chateau, France, assignor to Lacrouts Cazenave Sarl, Les Clayes Sous Bois, France

Filed Jun. 10, 1988, Ser. No. 205,450

Claims priority, application France, Dec. 6, 1987, 87 08494

Int. Cl.[5] B26D *3/00*; G06K *1/00*

U.S. Cl. 83—50 **5 Claims**

1. A method of putting a bar code on a thin strip, the bar code consisting of a plurality of parallel thin and wide bars of respective thin and wide widths and a plurality of thin and wide spaces separating the bars, the method comprising the steps of:

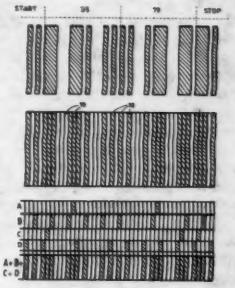
(a) forming each of the thin bars by pressing into the strip a tool having the thin width corresponding to that of the thin bar; and

(b) forming each of the wide bars by

(b^1) pressing into the strip another such thin tool having the relatively in width to form a respective partial wide bar,

(b^2) displacing the strip downstream,

(b^3) pressing into the strip immediately adjacent the partial wide bar another such thin tool having the relatively thin width to widen the partial wide bar, and



(b^4) repeating steps b^2 and b^3 until the partial wide bar is of the relatively wide width.

4,976,180

REVOLVING CUTTING PRESS

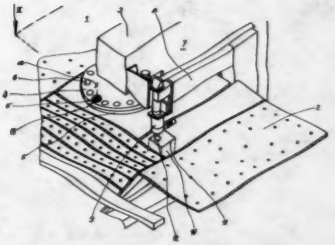
Gerhard Otto, Alfeld, Fed. Rep. of Germany, assignor to C. Behrens AG, Alfeld, Fed. Rep. of Germany

Filed May 9, 1988, Ser. No. 201,070

Claims priority, application Fed. Rep. of Germany, Jun. 24, 1987, 3720777

Int. Cl.[5] B26D *5/02*

U.S. Cl. 83—133 **19 Claims**



1. A revolving cutting press, comprising two revolving plates arranged at an axial distance from one another and supported rotatably about a common axis, said revolving plates having a peripheral region provided with a plurality of tool receptacles which are formed for receiving tool sets and are spaced from one another; a working station arranged so that each of the tool sets can be transferred to said working station during rotation of said revolving plates; a plunger which can be coupled with the tool sets in said working station, said tool receptacles being formed as insertion plates supported rotatably relative to said revolving plates about axes which are parallel to an axis of said revolving plates, each of the tool sets which are held in said insertion plates being transferable to said working station; said plunger being coupled with each of the tool sets in said working station, the tool sets of said insertion plates in said working station being movable relative to said revolving plates between a working position in which a coupling of the tool sets with said plunger is provided and rest positions in which a coupling with said plunger is not provided; means for moving said insertion plates between said positions and including drives mounted on a machine base body to be coupled with said insertion plates or uncoupled from said insertion plates, and also operative for a rotary movement of said insertion plates relative to said revolving

plates, each of said drives being formed as a motor-transmission unit, said plunger being coupleable in said working station directly with said insertion plates; means associated with said revolving plates for arresting of the tool sets of said insertion plates located outside of the working position, said axes of said insertion plates being arranged on a circle which is concentric to said axis of said revolving plates, said revolving plates including an upper revolving plate which holds an upper tool containing a punch and a punch holder for each tool set and another revolving plate which is a lower revolving plate and holds a lower tool containing a matrix for each tool set, said insertion plates including an upper insertion plate; said arresting means arranged on said machine base body and arresting said upper insertion plate and said punch holders of the tool sets in a predetermined height, said arresting means being formed as a circular holding plate with an outer boundary which is provided in said working station with a recess, so that and in the punch holder is said working station movable through said recess by said plunger.

4,976,181

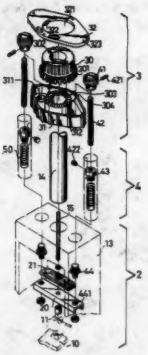
MEANS FOR REGULATING CYMBAL PEDAL TIGHTNESS

Wu H. Hsieh, No. 178, Chung Shan Ehr Rd., Lu Chou, Hsiang, Taipei Hsien, Taiwan

Filed Mar. 28, 1990, Ser. No. 500,743

Int. Cl.[5] G10D *13/00*

U.S. Cl. 84—422.3 **3 Claims**



1. A means for adjusting and maintaining cymbal pedal tightness, comprising:

a base adapted to rest on a support surface;

a first tube connected at one end to said base and supporting a lower cymbal, said first tube have a housing fixed thereto intermediate its ends;

a draw rod connected at one end to an upper cymbal, said draw rod extending through said first tube and having its other end fixed to a plate;

a pedal connected to said plate such that depression of said pedal causes said plate and draw rod to descend causing said upper cymbal to crash down on said lower cymbal creating an appropriate percussional effect, the improvement comprising:

a pair of tubes connected at one end to said base and at the other end to said housing, each of said pair of tubes having a slot therein;

an adjusting ring have gear teeth thereon;

a pair of small, toothed gears engageable with said adjusting ring gear teeth;

each of said small, toothed gears having a threaded rod fixedly connected thereto and extending into one of said pair of tubes;

a coupling block rotatably threaded onto each of said threaded rods, said coupling block having a pin thereon extending into one of said slots; and

a pair of springs, each having one end fixed to one of said coupling blocks and the other end fixed to said plate.

4,976,182

MUSICAL SCORE DISPLAY DEVICE

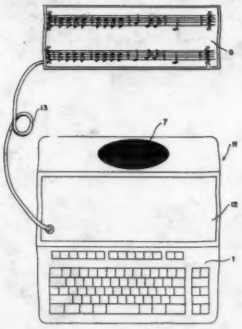
Yasuji Obuchi, Nara; Akira Hamada, Osaka; Hirokatsu Akiyama, Yamatokoriyama, and Yasuhisa Nakamura, Joyo, all of Japan, assignors to Sharp Kabushiki Kaisha, Osaka, Japan

Filed Oct. 14, 1988, Ser. No. 257,938

Claims priority, application Japan, Oct. 15, 1987, 62-159116[U]

Int. Cl.[5] G10G *1/04*

U.S. Cl. 84—462 **22 Claims**



1. A detachable musical score display device for a music score input apparatus which processes music score data inputted through an input device:

said detachable musical score display device receiving music score data from the music score input apparatus and displaying said music score data as a music score; and

said detachable musical score display device having a rectangular plate-like form so as to be detachably mounted to the music score input apparatus and including a cable for detachably connecting the detachable musical score display device with the musical score input apparatus to transmit the music score data.

4,976,183

DEVICE FOR A LAUNCHER ON AIR VEHICLE

Hans Norrvi, Solvik, Maspelösa, S-590 61 Vreta Kloster; Arne Wärnström, Lundbygatan 4A, S-595 00 Mjölby, and Jan-Erik Wuopio, Söderleden 1, S-582 57 Linköping, all of Sweden

PCT No. PCT/SE89/00265, § 371 Date Feb. 1, 1990, § 102(e) Date Feb. 1, 1990, PCT Pub. No. WO89/12210, PCT Pub. Date Dec. 14, 1989

PCT Filed May 16, 1989, Ser. No. 460,180

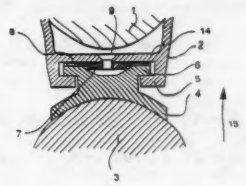
Claims priority, application Sweden, Jun. 10, 1988, 8802168

Int. Cl.[5] F41F *3/06, 7/00*

U.S. Cl. 89—1.819 **4 Claims**

1. A device for a launcher on an air vehicle for detachably carrying and guiding a missile or the like, which launcher comprises at least one means for guiding the missile in the longitudinal direction of the launcher, the guiding means comprising a first profile element (2) attached to the launcher, and a second profile element (4) attached to the missile, which profile elements are arranged to interact so that a free mutual movement in the longitudinal direction of the launcher is admitted, while movement in lateral directions is limited, characterized in that the device comprises a profile plate (7) and a number of relatively thin shims (8), the plate (7) and shims (8)

being arranged securably in the first profile element (2) in order to so limit by means of an appropriate number of shims the mutual movement of the first (2) and the second (4) profile elements in the load carrying direction across the longitudinal



direction of the launcher, that the required allowance between the profile elements for the mutual movability of the profile elements in the longitudinal direction of the launcher is maintained.

4,976,184

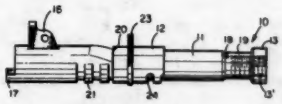
AUTOMATIC PISTOL BARREL AND RECOIL COMPENSATOR

Joseph M. Bunczk, 248 Miami Ave., Norristown, Pa. 19403

Filed Jan. 18, 1990, Ser. No. 466,771

Int. Cl.[5] F41A *21/36*

U.S. Cl. 89—14.3 **11 Claims**



1. A barrel and recoil compensator for a slide-type automatic pistol comprising a tubular cylindrical body member having an internal bore for forming a gun barrel and an axially movable slide chamber assembly surrounding said cylindrical body member,

said cylindrical body member having at one end portion means for detachably securing said cylindrical body means to said pistol, an opposite end portion and a shoulder portion therebetween,

said shoulder portion forming a first stop means for said slide chamber assembly,

said opposite end portion having an enlarged end cap forming a second stop means for said slide assembly and a reduced external diameter area adjacent said enlarged end cap,

venting aperature means formed through the wall of said cylindrical body member about said reduced external diameter area for venting gases from the bore of said cylindrical body member,

said slide assembly having at least one gas venting means,

means for associating said compensator with a breech bolt slide of a pistol and

means for associating said compensator with a recoil spring of a pistol, whereby the slide assembly while in the forward position forms a secondary pressure chamber with said reduced diameter area to equalize forces on the base of a bullet in the cylindrical body member resulting from spent gases.

4,976,185

AMMUNITION FEED

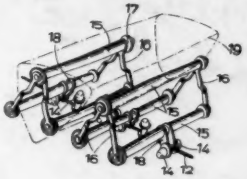
Philip A. M. Wixon, and Denis K. C. Clarke, both of Wolverhampton, England, assignors to Lucas Industries Public Limited Company, England

Filed Jun. 12, 1989, Ser. No. 365,019

Claims priority, application United Kingdom, Jun. 17, 1988, 881449

Int. Cl.[5] F41A *9/04*

U.S. Cl. 89—35.01 **18 Claims**



1. An ammunition feed for transporting loosely held rounds or cartridges, said feed comprising a cable, a guide chute having first and second walls, each of said walls having a midpoint, said cable being flexible in two perpendicular planes and movable along approximately said midpoint of said first wall and a plurality of transverse members, each of said plurality of transverse member comprising a number of upper transverse elements coupled to a number of lower transverse elements and means for securing a midpoint of each of said lower transverse elements to said cable, said transverse members being spaced successively along said cable such that said rounds or cartridges may be trapped between said successive transverse members along said guide chute.

4,976,186

CONTROL SYSTEM FOR MECHANICALLY ADJUSTABLE SPEED MOTOR DRIVES

Keith L. Carmichael, Columbus, Ind., and James F. Runyan, Cincinnati, Ohio, assignors to Reliance Electric Company, Greenville, S.C.

Filed Dec. 20, 1988, Ser. No. 287,097

Int. Cl.[5] F01B *1/00*

U.S. Cl. 91—166 **10 Claims**

1. A control system for a mechanically adjustable speed motor drive, having a shiftable speed control for controlling the speed of said motor drive, comprising:

(a) a pneumatic double acting cylinder having a piston rod connected to said shiftable speed control for shifting the position of said control to vary the speed of said motor drive;

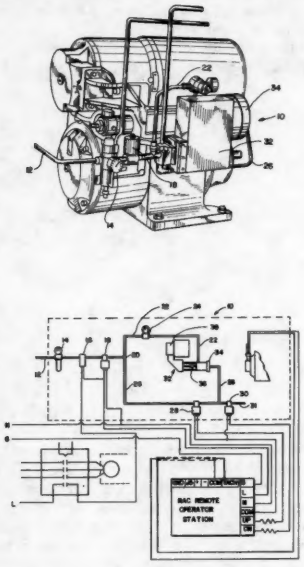
(b) an air supply line for supplying air at a first predetermined pressure;

(c) a pressure regulator for receiving said supplied air and for changing the pressure of the supplied air to a first predetermined pressure;

(d) a first line for receiving said air under said first predetermined pressure and for directing it to the back side of said double acting cylinder, having means between said pressure regulator and said back side of said cylinder for reducing said first predetermined pressure to a lower second predetermined pressure before it reaches the back side of said cylinder;

(e) a second line for receiving said air at said first predetermined pressure and for directing it to the front side of said cylinder at said first predetermined pressure, having a solenoid operated control valve in said second line between said pressure regulator and said cylinder for controlling the flow of air to said cylinder to increase the volume and pressure of air in the front side of said cylinder

when it is desired to increase the speed of said motor drive; and



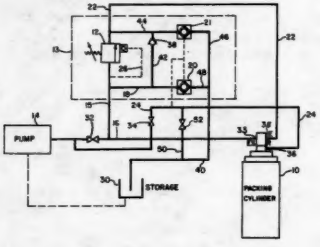
(f) a solenoid operated bleeding valve and line for evacuating air from the front side of said cylinder when it is desired to reduce the speed of said motor drive.

4,976,187

FAST SWEEP POWER CYLINDER FOR REFUSE TRUCKS

Kenneth L. Yeazel, Tulsa, Okla., assignor to Crane Carrier Company, Tulsa, Okla.

Filed Aug. 24, 1988, Ser. No. 236,043
Int. Cl.[5] F01B *7/20*
U.S. Cl. 91—173 **1 Claim**



1. A fast sweep system for extending the telescopically extendable concentric cylinders of a packing cylinder unit and which packing cylinder unit has a retract port R an extent port ES for conducting power fluid to a small concentric cylinder and an E port for conducting fluid to a concentric cylinder which is larger than said small concentric cylinder which comprises:

a power fluid storage;

a power fluid source;

a first extend power conduit connected to the output of said power fluid source;

a first extend branch conduit extending from said first extend power conduit to said ES port;

a second extend branch conduit extending from said first extend power conduit to said E port;

a sequence valve within said second extend branch conduit, said valve being normally closed and operable to open when the pressure in said extend power conduit reaches preselected value;

a retract conduit extending from said power fluid source to said R port;

a first valve in said first extend power conduit;

a second valve in said retract conduit;

first connecting means to connect said retract conduit to said storage and having a valve therein;

a second connecting means for connecting said second extend branch conduit to said storage by way of a return conduit;

said second connecting means comprising, a first fluid return branch conduit connecting said second branch conduit with said return conduit;

a second fluid return branch conduit connecting said second extend power conduit to said return conduit;

a first and a second pressure operated check valve in said respective first fluid branch conduit and in said second fluid return branch conduit respectively;

means to open said first and second pressure operated check valve upon the pressure in said retract conduit reaching a predetermined value;

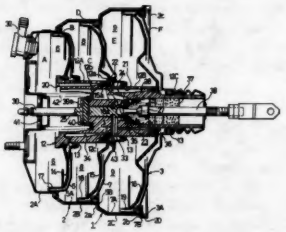
a shunt conduit connecting said first and second return branch and a check valve therein permitting flow of fluid only from said first to said second return branch conduits.

4,976,188

BRAKE BOOSTER

Haruo Suzuki, and Hiroya Gotoh, both of Saitama, Japan, assignors to Jidosha Kiki Co., Ltd., Tokyo, Japan

Filed Sep. 28, 1989, Ser. No. 413,877
Claims priority, application Japan, Oct. 24, 1988, 63-267574
Int. Cl.[5] F15B *9/10*
U.S. Cl. 91—369.2 **7 Claims**



1. A brake booster comprising a plate fixedly disposed within a shell to divide the interior of the shell into a front chamber and a rear chamber, a valve body slidably extending through the plate, a seal member mounted on the plate for sealing the valve body against the plate, a front power piston and a rear power piston disposed in the front chamber and the rear chamber, respectively, and connected to the valve body, a front diaphragm and a rear diaphragm applied to the back side of each of the front and the rear power piston and acting to divide each of the front chamber and the rear chamber into a forwardly located, constant pressure chamber and a rearwardly located, variable pressure chamber, a constant pressure passage providing a communication between the constant pressure chambers, a variable pressure passage providing a

communication between the variable pressure chambers, a valve mechanism contained within the valve body for switching a communication between the constant pressure passage and the variable pressure passage on one hand and a pressure passage which supplies a pressure fluid, and an input shaft mechanically coupled to a brake pedal to be driven for reciprocating motion, thereby switching a fluid path within the valve mechanism in accordance with its movement;

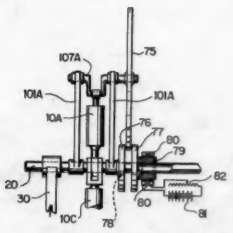
characterized in that a stepped end face is formed on the outer peripheral surface of the valve body at a location which is within the rear chamber so as to exhibit a reduced diameter toward its rear end, and in which the seal member is disposed in sliding contact with the outer peripheral surface of the valve body at a location located forwardly of the stepped end face, the rear end of the constant pressure passage opening into the stepped end face, the rear power piston being connected to the valve body at a location rearward of the stepped end face and at a spacing from the stepped end face, the rear end of the constant pressure passage communicating with the rear constant pressure chamber through a clearance between the stepped end face and the rear power piston.

4,976,189

MOTION TRANSLATING DEVICE

Ross M. McCullough, 4101 Bath Road, Kingston, Ontario, Canada K7M 4Y8

Filed Jul. 3, 1989, Ser. No. 374,756
Int. Cl.[5] F01B *3/10*
U.S. Cl. 91—476 **9 Claims**



1. A motion translating device comprising:

(a) a frame;

(b) a main shaft journaled on said frame for rotation;

(c) at least two units mounted on said main shaft for rotation therewith, said units being equi-spaced from one another circumferentially around said main shaft and each comprising:

(i) a rigid arm secured to and radiating outwardly from said main shaft;

(ii) a crank arm journaled on said rigid arm for rotation about an axis parallel to and offset from the axis of rotation of said main shaft; and

(iii) a fluid actuated piston cylinder unit anchored at one end to said main shaft for limited oscillatory movement thereon and at the other end connected to the crank portion of said crank arm;

(d) means for resisting rotation of said crank arm;

(e) fluid flow passage means through said shaft to said piston cylinder units including rotary couplings for connection to a pressure source external to said device; and

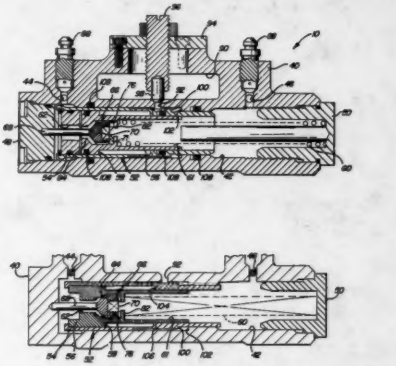
(f) sequence and control valve means controlling flow of fluid to and from said piston cylinder units and in response to rotation of said crank arm shaft.

4,976,190

HYDRAULIC BRAKE INTENSIFIER

Leo A. Cooney, 459 Washington Rd., Grosse Pointe, Mich. 48230

Filed Mar. 28, 1989, Ser. No. 329,795
Int. Cl.[5] F15B *11/00, 13/00*
U.S. Cl. 91—535 **6 Claims**



1. A hydraulic brake pressure intensifying apparatus (10) of the type for boosting the hydraulic pressure in a vehicular braking system, said apparatus (10) comprising: a fluid cylinder (42) extending axially between an inlet end (44) and an outlet end (46); a first piston (54) slideably disposed in said cylinder (42); a second piston (56) telescopically disposed in said first piston (54) and including an inner chamber defined by an annular inner wall (76); biasing means (60) disposed in said cylinder (942) for urging said first (54) and second (56) pistons axially toward said inlet end (44) of said cylinder (42); a flow passage (62) extending axially through said first piston (54) and said inner chamber of said second piston (56) for communicating hydraulic fluid between said inlet (44) and outlet (46) ends of said cylinder (42); valve means (66) disposed in said inner chamber of said second piston (56) for preventing fluid flow through said flow passage (62) at a predetermined fluid pressure at said inlet end (44) of said cylinder (42); and characterized by said valve means (66) including a frustoconical valve member (70) and said flow passage (62) including a matingly shaped seat surface (64) for mating engagement with said valve member (70) over a frustoconically shaped surface area to seal fluid flow through said flow passage (62) at elevated pressure, and said valve means (66) including an integral guide portion (74) extending axially from said frustoconical valve member (70) and including a plurality of outwardly extending splines for slideably engaging said inner chamber of said second piston (56) and slideably supporting said valve means (66) in said inner chamber while allowing hydraulic flow through said inner chamber between said splines.

4,976,191

ELASTICALLY DEFORMABLE FLUID ACTUATOR

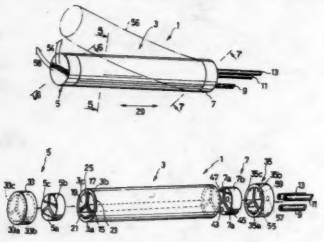
Koichi Suzumori, Yokohama; Takafumi Matsumaru, Tokyo, and Shoichi Iikura, Yokohama, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Oct. 17, 1989, Ser. No. 422,742
Claims priority, application Japan, Oct. 17, 1988, 63-259391; Oct. 19, 1988, 63-261314
Int. Cl.[5] F01B *19/00*
U.S. Cl. 92—48 **46 Claims**

1. An actuator comprising:

(a) a tubular elastic body of which interior is separated into

a plurality of pressure chambers by an axially extending partition; and



(b) means for adjusting respective pressures of said pressure chambers.

4,976,192

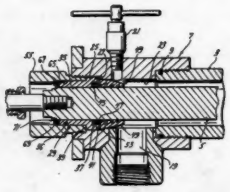
RECIPROCATING PUMP

Ayzik Grach, Creve Coeur, Mo., assignor to McNeil (Ohio) Corporation, St. Paul, Minn.

Filed Jan. 9, 1989, Ser. No. 295,126

Int. Cl.[5] F16J *15/18*

U.S. Cl. 92—165 R **12 Claims**



1. A reciprocating pump comprising a cylinder and a plunger reciprocal therein, a member at one end of the cylinder having an axial passage in which the plunger is axially slidable and a seal between said member and the plunger, and characterized in having means for protecting the seal from the effects of relatively high pressure and pressure fluctuations of fluid in the cylinder comprising a sleeve surrounding the plunger, said sleeve being separate from said member and disposed in its entirety inwardly of said member and the seal, said sleeve having an axial bore in line with said axial passage in said member and blocking communication from within the cylinder to said axial passage in said member and the seal except for such communication as there may be through said bore in said sleeve to said axial passage in said member, said plunger being axially slidable in said bore, said sleeve having a series of annular internal grooves therein spaced axially thereof establishing a pressure-reducing path from the inner to the outer end of said sleeve for reducing the pressure and fluctuations in pressure of material from the cylinder on the seal.

4,976,193

BELLOWS WITH A MINIMIZED COMPRESSION SIZE

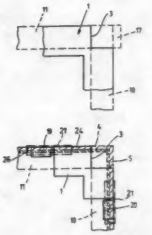
Kurt Hennig, Georgensteinstr. 16, 8000 München 71, Fed. Rep. of Germany

Filed Apr. 20, 1989, Ser. No. 340,906

Claims priority, application Fed. Rep. of Germany, May 5, 1988, 3815401

Int. Cl.[5] F01B *19/00*; F16J *3/00*

U.S. Cl. 92—261 **13 Claims**



1. A bellows, including an accordion extensible in an axial direction comprises a cover and at least one side wall intersecting said cover, with said cover and side wall each including alternating inside and outside facing pleats which run transverse to the axial direction, with the pleats of the cover and side wall overlapping at their intersection and forming a zone of increased thickness in the pleats, supporting elements provided in at least some of said pleats, characterized in that the supporting elements (1, 1') define notches (3, 3') at least for receiving the overlapping pleats in the zone (2) of the corner area of the bellows, where the folded material of the pleats overlap.

4,976,194

BREAD TOASTER

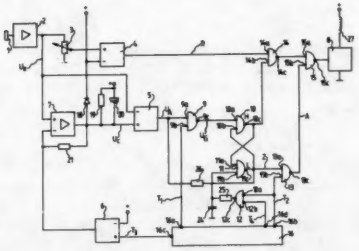
Heinz Kelterborn, Karben, and Heinz Schiebelhuth, Frankfurt, both of Fed. Rep. of Germany, assignors to Braun Aktiengesellschaft, Kronberg, Fed. Rep. of Germany

Filed Dec. 20, 1989, Ser. No. 453,719

Claims priority, application Fed. Rep. of Germany, Dec. 24, 1988, 3843947

Int. Cl.[5] A47J *37/08*; H05B *1/02*

U.S. Cl. 99—328 **18 Claims**



1. A bread toaster comprising housing structure with, a toasting chamber with a heating device arranged therein, at least one loading and unloading opening for an item to be toasted, and retaining means for an item to be warmed up mountable on top of said loading and unloading opening, a step-switch for controlling said heating device, a first coupling stage connected to said step-switch, said first coupling stage

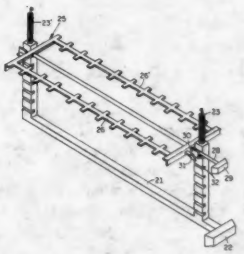
having a first input responsive to a toasting-time control signal (R) and a second input responsive to a warming-up time control signal (A), a sensor responsive to infrared radiation emitting from the heated item being toasted in said toasting chamber and adapted to deliver a sensor signal (U_s) derived therefrom, a first comparator circuit responsive to said sensor signal (U_s) for issuing when said sensor signal attains a predetermined level, circuitry for applying said toasting-time control signal (R) to said first input of said first coupling stage for controlling said heating device, and a control circuit which, at a first definable moment (t_1) after start-up of the bread toaster, is adapted to compare said sensor signal (U_s) with a reference signal (U_c), whereupon in the event that said reference signal (U_c) is in excess of said sensor signal (U_s), the bread toaster will be set out of operation after said predetermined level of said sensor signal (U_s) is attained by the fact that said toasting-time control signal (R) is delivered from said first comparator to said first input of said first coupling stage, whilst in the opposite case, said heating device is switched off by said warming-up time control signal (A) which is generated by said control circuit at a second definable moment (t_2) and is supplied to said second input of said first coupling stage.

4,976,195

COMBINATION BREAD AND TORTILLA TOASTER

Amado F. Cavazos, 302 Wyndale, San Antonio, Tex. 78209

Filed May 10, 1990, Ser. No. 521,608
Int. Cl.[5] A47J *37/08*
U.S. Cl. 99—391 **5 Claims**



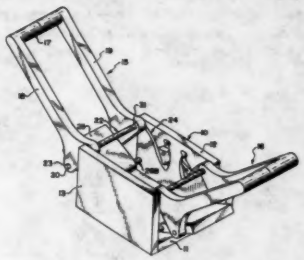
1. An apparatus for reheating baked goods, comprising:
an exterior casing having a plurality of loading slots at an upper end;
a bread carrier adjustably mounted within said exterior casing, said bread having a plurality of depth adjusting notches;
a bread carrier lever connected to said bread carrier such that an end of said bread carrier lever protrudes externally out of said casing;
a depth adjustment frame formed by a plurality of platforms, adjustably mounted to said bread carrier;
said plurality of platforms corresponding in number and contained within said plurality of loading slots;
a depth adjustment lever connected via a rod to said frame such that one end of said depth adjustment lever protrudes externally out of said casing;
depth adjusting meaL selectively adjusting the depth of said frame to correspond to the vertical level of a selected pair of said depth adjusting notches of said bread carrier;
adjustable side support means formed by a plurality of support frames, a plurality of support arms, and a plurality of vertical wires; and
a side support adjustment lever operatively connected via a shaft to said adjustable side support means.

4,976,196

COMPACTION OF ALUMINUM BEVERAGE CANS

Wilson C. Phillips, Saskatoon; Anita Germann, Regina, and Orville J. Olm, Saskatoon, all of Canada, assignors to Wita Products Limited, Saskatoon, Canada

Filed Apr. 6, 1989, Ser. No. 334,187
Int. Cl.[5] B30B *7/00*
U.S. Cl. 100—233 **19 Claims**



1. Apparatus for crushing a can which includes a cylindrical peripheral wall having a longitudinal axis and a pair of ends at right angles to the axis, the apparatus comprising a base member defining a surface against which the can is laid and is crushed, means defining an area on the base member for receiving the can with the axis of the can parallel to the surface, the ends of the can standing substantially outwardly at right angles from the surface, one side of the can being adjacent the surface and an opposed side of the can being rotates from the surface, first crushing means arranged to engage the peripheral wall at said opposed side of the can and to press the opposed side of the peripheral wall toward said one side such that the ends tend to partly fold inwardly toward the first crushing means, and second crushing means arranged to engage the ends of the can in the partly folded condition thereof and to compress the ends towards said surface of the base member, said first crushing means comprising a first and a second crushing member each extending transversely to the axis of the can and spaced apart axially of the base member so as to engage the can at a position thereon just inside a respective one of the ends thereof, limit means controlling movement of such crushing members so as to halt a crushing action of said first crushing means at a position spaced from the base member, and a first and a second lever device, each of said lever devices including a handle for manual movement thereof, each of said lever devices having a first crushing member forming one part of said first crushing mans and an end crushing member forming one part of said second crushing means, said first crushing member and said end crushing member being actuable by movement of said lever device.

4,976,197

REVERSE SIDE PRINTING DEVICE EMPLOYING SHEET FEED CYLINDER IN SHEET-FED PRINTER

Hiroshi Yamanari, and Nobuhiko Fujisawa, both of Hiroshima, Japan, assignors to Ryobi, Ltd., Hiroshima, Japan

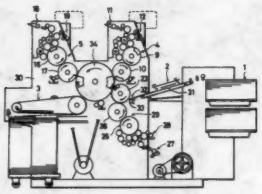
Continuation-in-part of Ser. No. 225,642, Jul. 27, 1988, abandoned, which is a continuation of Ser. No. 44,547, May 1, 1987, abandoned. This application Apr. 4, 1990, Ser. No. 504,078
Int. Cl.[5] B41F *7/12, 7/06*
U.S. Cl. 101—137 **1 Claim**

1. A double-sided sheet printing machine, comprising:
a sheet feeding section for feeding sheets of paper;
a first printing section for printing a first side of said sheets and including a first impression cylinder;
a rotating cylinder forming a combined sheet feed and impression cylinder functioning as a sheet feed cylinder for

said first printing section and a second impression cylinder for a second printing section, said rotating cylinder having a rotating axis and being disposed between said sheet feeding section and said first printing section;

a plate cylinder disposed beneath a horizontal plane including said rotating axis of said rotating cylinder, and on a paper feeding side of a vertical plane including said rotating axis of said rotating cylinder;

a blanket cylinder receiving an image from said plate cylinder and transferring said image to said second side of said sheets disposed on said rotating cylinder, whereby said second side of said sheets is printed, and



a third printing section downstream of said first printing section, and receiving sheets from said first printing section, said third printing section printing on said first side of said sheets,

at least said blanket cylinder being shiftable into and out of contact with said rotating cylinder, and wherein said combination of said rotating cylinder, said blanket cylinder and said plate cylinder constitute said second printing section for printing on said second side of said sheets prior to a feed of said sheets by said rotating cylinder to said first printing section first impression cylinder.

4,976,198

GRAIN STRUCTURE FOR LITHOGRAPHIC PRINTING PLATE SUPPORTS

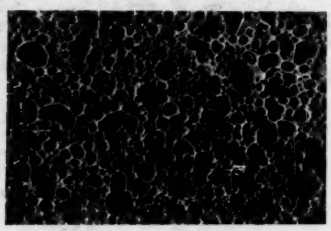
Hisao Ohba; Kazutaka Oda; Hirokazu Sakaki; Akira Shirai, and Azusa Ohashi, all of Shizuoka, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Continuation of Ser. No. 652,420, Sep. 19, 1984, abandoned, which is a continuation of Ser. No. 135,395, Mar. 31, 1980, abandoned. This application Jan. 23, 1987, Ser. No. 8,121

Claims priority, application Japan, Aug. 16, 1979, 54-104473

Int. Cl.[5] B41N *1/08*

U.S. Cl. 101—459 **8 Claims**



5. A presensitized printing plate comprising a photosensitive layer on a support, wherein said support comprises an aluminum sheet, the surface of which has a grain structure, as observed upon magnifying 2,000 times under a scanning electron microscope, comprising mounds and pits, wherein the pits each have a defined opening and uniformly pierce the surface of said mounds in a direction nearly perpendicular to the surface of the mounds, and are present in such a sparse uniform density that a substantial proportion of the surface of the mounds is still apparent, wherein the surface of the mounds is the small region between the pits on a large mound, wherein the pits are produced by electrolytic etching, wherein said support has a distribution of pit diameters such that the pits corresponding to 5% and 95% on a cumulative frequency curve for pit diameters are 3μor less, and 7μor less, in diameter, respectively, wherein said pits are present in a density of 10^6 to 10^8 pits/cm^2.

4,976,199

BLASTING SYSTEM AND ITS METHOD OF CONTROL

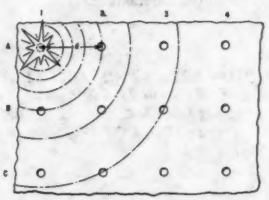
Christo A. Beukes; Vivian E. Patz, and Thrasyvoulas Morsitis, all of Johannesburg, South Africa, assignors to Expert Explosives (Proprietary) Limited, South Africa

Filed Aug. 28, 1989, Ser. No. 398,890

Claims priority, application South Africa, Sep. 1, 1988, 88/6500

Int. Cl.[5] F42D *1/055*

U.S. Cl. 102—200 **5 Claims**



1. A method for controlling a blasting operation, comprising:

initiating at least a first blast at a first location;

monitoring a shock wave produced by at least the first blast at each of a plurality of monitoring locations which are spaced from the first location;

transmitting data derived from monitoring the shock wave from each of the monitoring locations to a central location;

calculating delay periods associated with the respective monitoring locations at the central location;

transmitting information on the delay periods to each of the monitoring locations; and

controlling a sequence of blasts at the respective monitoring locations, each blast at each respective monitoring location having a respective delay period associated therewith.

4,976,200

TUNGSTEN BRIDGE FOR THE LOW ENERGY IGNITION OF EXPLOSIVE AND ENERGETIC MATERIALS

David A. Benson; Robert W. Bickes, Jr., and Robert S. Biewer, all of Albuquerque, N. Mex., assignors to The United States of America as represented by the United States Department of Energy, Washington, D.C.

Filed Dec. 30, 1988, Ser. No. 292,201

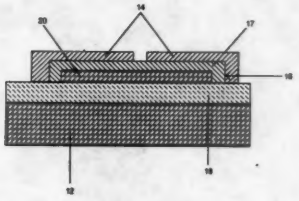
Int. Cl.[5] F42B *3/10*

U.S. Cl. 102—202.7 **16 Claims**

11. A method of manufacturing metal film bridge devices for the ignition of explosive and energetic materials comprising the steps of:

defining a bridge shape from a first material on an insulating substrate, said first material being an insulator that intrinsically conducts when heated;

selectively depositing a layer of tungsten over the entire bridge shape; and



depositing a pair of conductive lands over the tungsten layer such that said lands are spaced apart one from another.

4,976,201

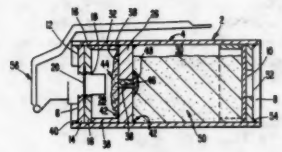
NON-LETHAL DISTRACTION DEVICE

James E. Hamilton, Tallahasse, Fla., assignor to Martin Electronics, Inc., Perry, Fla.

Filed Nov. 1, 1989, Ser. No. 429,940

Int. Cl.[5] F42B *3/00*

U.S. Cl. 102—323 **13 Claims**



1. A distraction device comprising:

a container that is substantially hollow inside;

separator means within the container for dividing the inside of the container into a first chamber and a second chamber, wherein the separator means has a first surface in the first chamber and a second surface in the second chamber;

aperture means in the container for communication between the first chamber and environment surrounding the container;

rupturable membrane means for closing the aperture in the container;

opening means in the separator means for communication between the first chamber and the second chamber;

a combustible, rapid-burning, gas-producing, first composition in the first chamber over the first surface of the separator means;

a combustible, spark-producing, third composition in the second chamber over the second surface of the separator means;

a combustible, time delay, second composition in the opening means in the separator, wherein the combustible second composition is in contact with the first composition and the third composition and is capable of being ignited by the first composition and of subsequently igniting the third composition;

an explosive output charge in sufficient amount in the second chamber to produce an audible blast and brilliant flash of light to distract or disorient a subject proximate to the distraction device, wherein the output charge is ignitable by the spark-producing, third composition; and

wherein the container is comprised of lightweight material that forms non-lethal fragments if the container breaks when the distraction device initiates.

4,976,202

ANTITANK-ANTIPERSONNEL WEAPON

Richard F. Honigsbaum, 245 Passaic Ave., Passaic, N.J. 07055

Filed May 31, 1988, Ser. No. 200,702

Int. Cl.[5] F42B *13/46*

U.S. Cl. 102—367 **25 Claims**

1. An antitank-antipersonnel weapon comprising a housing, said housing containing at least one lens-compromising agent, a means for propelling said at least one lens-compromising agent toward the lenses of said tank and/or the lenses of the protective masks of said personnel, at least one human irritant, and a means for delivering said human irritant to within irritating proximity of said personnel.

4,976,203

WARHEAD WITH CASING AND LINER FORMING AN INTEGRAL UNIT

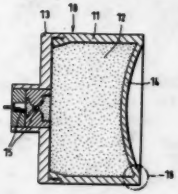
Herbert P. Weisshaupt, Aachen; Hans Orth, Düsseldorf; Hendrik R. Lips, Düsseldorf, and Wilfried Scheldeler, Düsseldorf, all of Fed. Rep. of Germany, assignors to Rheinmetall GmbH, Düsseldorf, Fed. Rep. of Germany

Filed Dec. 7, 1989, Ser. No. 447,396

Claims priority, application Fed. Rep. of Germany, Jan. 7, 1989, 3900269

Int. Cl.[5] F42B *13/00*

U.S. Cl. 102—476 **6 Claims**



1. A warhead for denoting an explosive, comprising:

a body surrounding the explosive and having one end; and

a projectile forming liner connected to the one end of said body, wherein at least a portion of said body immediately adjacent said liner and said liner form an integral unit and are made of the same material, and said liner includes means for defining weakened zones on its circumference in the region of transition between said liner and said body, said weakened zones producing a clean separation between said liner and said body as a result of detonative reshaping

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4,976,204

UTILITY SURFACE SUPPORTING AND STABILITY STRUCTURE

Robert E. Konkle, 9893 Weld County Rd., #11, Longmont, Colo. 80501

Continuation of Ser. No. 208,234, Jun. 17, 1988, abandoned. This application Dec. 15, 1989, Ser. No. 456,182

Int. Cl.[5] A47B *23/00*

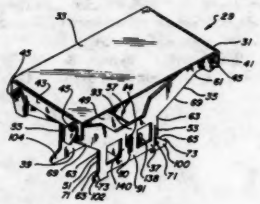
U.S. Cl. 108—43 **14 Claims**

1. A supporting and stabilizing structure for securely maintaining a preselected orientation of a utilization area adjacent to the left and right legs of a user of the utilization area, the user's legs each having an inner thigh region, said supporting and stabilizing structure comprising:

support means for supporting a utility surface located at said utilization area, said support means including a forward edge and a rearward edge and left and right lateral edges extending between said forward and rearward edges, said left and right edges being adjacent to different ones of the

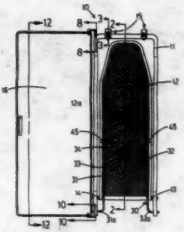
left and right legs of a user when said preselected orientation of said utilization area is maintained;

a first stabilizing wall having an upper part and first and second sides and being connected to said forward edge of said support means so that said upper part of said first stabilizing wall extends substantially entirely between said left and right edges of said support means, said first and second sides of said first stabilizing wall each including a contoured portion, said contoured portions being substantially unyielding in directions toward and away from each other, each of said contoured portions having a lower contour section, a central contour section and an upper contour section between said central contour section and said upper part of said first stabilizing wall, said lower contour sections extending from said central contour sections in directions having a component away from each other;



a second stabilizing wall having an upper part and first and second sides and being connected with said rearward edge of said support means so that said upper part of said second stabilizing wall extends substantially entirely between said left and right edges of said support means, said first and second sides of said second stabilizing wall each including a contoured portion that includes a lower contour section, a central contour section and an upper contour section between said central contour section and said upper part of said second stabilizing wall, said lower contour sections thereof extending from said central contour sections thereof in directions having a component away from each other, said first and second stabilizing walls being connected with said support means so that a constant substantially perpendicular orientation relative to said utility surface, and a substantially parallel orientation relative to each other, is maintained.

non-gravity means attached to said assembly to bias said mounting frame on an incline towards said door, whereby



said frame tends to be maintained snug against the door during ironing.

4,976,205

DOOR MOUNTED IRONING BOARD ASSEMBLY

Benson L. Miller; Paul T. Scherer, both of Lexington, and Neiman C. Maclin, Louisville, all of Ky., assignors to Millex, Inc., Nicholasville, Ky.

Continuation of Ser. No. 98,558, Sep. 21, 1987, Pat. No. 4,899,667. This application Aug. 4, 1989, Ser. No. 389,878

Int. Cl.[5] A47B *5/00*

U.S. Cl. 108—47 **18 Claims**

1. An ironing board assembly for standard door mounting or the like comprising:

a portable mounting frame;

an ironing board having a normal ironing surface and length and being pivotally mounted on said frame for lowering to an operative, substantially horizontal position at normal ironing height and for retracting to a storage, substantially vertical position; and

bracket means adjacent the top of the frame adapted for engaging the top edge of the door; said bracket means including at least one inverted U-shaped hook for hanging over the top edge of the door; said bracket means remaining attached to the frame in both positions, and positive,

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4,976,206

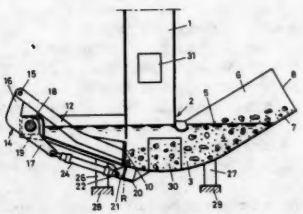
MECHANISM FOR THE REMOVAL OF SLAG IN INCINERATION PLANTS

Hansruedi Steiner, Wettingen, and Hans Weber, Mellingen, both of Switzerland, assignors to W+E Umwelttechnik AG, Zurich, Switzerland

Filed Oct. 18, 1989, Ser. No. 422,966

Int. Cl.[5] E23J *1/02*

U.S. Cl. 110—171 **9 Claims**



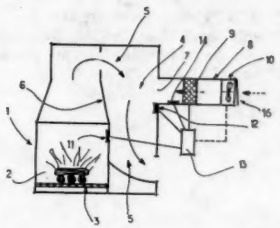
1. A mechanism for the removal of slag from an incineration plant, particularly for refuse incineration, having a substantially vertically positioned slag shaft provided at one end of a furnace grate and a slag tank in communication with said shaft and having a water bath therein, and an upwardly sloping discharge path means, the mechanism comprising a ram including a pusher plate positioned in said tank; and thrust piston drive means operatively connected to said pusher plate to impart to said plate a reciprocating motion to move the slag contained in said bath towards said discharge path means, said piston drive means being positioned along an outside bottom wall of said tank and being connected to said pusher plate by means of a linkage, said linkage including at least one push rod connected at one end thereof to said pusher plate and having another end remote from said pusher plate and positioned outside of said tank and above the level of the water filling said slag tank throughout the entire stroke of said pusher plate, a rocking shaft mounted on a wall of said slag tank opposite said discharge path means, and at least one toggle lever fixed to said rocking shaft and connecting said push-rod and a piston of said thrust piston drive means to each other.

4,976,207

PROCESS OF IMPROVED POSTCOMBUSTION WITH RAPID TRIGGERING AND MEANS FOR IMPLEMENTATION IN A HEATING AND INCINERATION DEVICE

Robert Richard, Thann, and Gilles Prado, Rimbach pres Masevaux, both of France, assignors to Fondis, S.A., Thann, France

Filed Dec. 23, 1988, Ser. No. 289,030
Claims priority, application France, Dec. 23, 1987, 87 18257
Int. Cl.[5] F23B 5/00; F23C 9/00; F23G 7/06
U.S. Cl. 110—214 36 Claims



1. A process for implementing post-combustion of unburned gas and volatile materials issuing from the combustion of solid fuels within a combustion chamber of heating equipment, such as, for example, boilers, furnaces, incinerators, and the like, comprising the steps of:

establishing a flow of fresh combustive air within a conduit which is fluidically connected at one end thereof to a source of fresh combustive air and to a post-combustion chamber, which is located within the vicinity of an outlet of said combustion chamber, at an opposite end thereof;

pre-heating said flow of fresh combustive air within said conduit, by means independent of said combustion within said combustion chamber, to a temperature level of at least 400° C.;

detecting the temperature levels within said combustion chamber and said post-combustion chamber;

injecting said pre-heated air flowing within said conduit into said post-combustion chamber when said temperature level detected within said combustion chamber is indicative of combustion within said combustion chamber and until said temperature level detected within said post-combustion chamber is indicative of self-maintenance of post-combustion within said post-combustion chamber;

decreasing the temperature level of said air flow within said conduit to a predetermined level less than said 400° C. temperature level upon detection of said temperature level within said post-combustion chamber indicative of said self-maintenance of said post-combustion within said post-combustion chamber, while continuing to inject said air flow from said conduit into said post-combustion chamber;

detecting an increase in the temperature level within said combustion chamber indicative of reactivation of said combustion within said combustion chamber; and

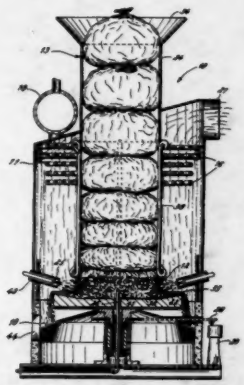
increasing the temperature level of said fresh combustive air flowing within said conduit and being injected into said post-combustion chamber to at least 400° C. so as to again implement self-maintenance of said post-combustion within said post-combustion chamber.

4,976,208

WATER COOLED INCINERATOR

Chadwell O'Connor, 2024 Galaxy Dr., Newport Beach, Calif. 92660

Filed Dec. 1, 1989, Ser. No. 444,661
Int. Cl.[5] F23B 7/00
U.S. Cl. 110—234 21 Claims



1. An incinerator for burning combustible material comprising, in combination,

a firebox,

a horizontal substantially circular burning disk rotatably supported in said firebox,

a combustion zone substantially immediately above the upper surface of the disk,

means for rotating said disk,

means for supplying compacted material to the disk,

a combustion air supply extending into said firebox and ending at a central nozzle extending upward through the center of the disk and at least one peripheral nozzle located along the periphery of the disk above the upper surface of the disk, said central nozzle having means for directing air into the combustion zone in a direction substantially horizontal to the upper surface of the disk, and said peripheral nozzle directed to drive air into the combustion zone, such that rotation of the disk exposed unburnt surfaces of the compacted material to combustion air whereby the combustible compacted material burns substantially completely.

4,976,209

FURNACES FOR INCINERATING WASTE MATERIAL

Peter R. Piggin, Gaulby, United Kingdom, assignor to Erithglen Limited, United Kingdom

PCT No. PCT/GB87/00712, § 371 Date Mar. 29, 1989, § 102(e) Date Mar. 29, 1989, PCT Pub. No. WO88/02834, PCT Pub. Date Apr. 21, 1988
PCT Filed Oct. 8, 1987, Ser. No. 340,677
Claims priority, application United Kingdom, Oct. 11, 1986, 8624421; Jul. 15, 1987, 8716680
Int. Cl.[5] F23B 7/00
U.S. Cl. 110—234 12 Claims

1. A furnace for incinerating waste material comprising

an upright combustion chamber;

an inlet means at an upper part of the combustion chamber for supplying the waste material;

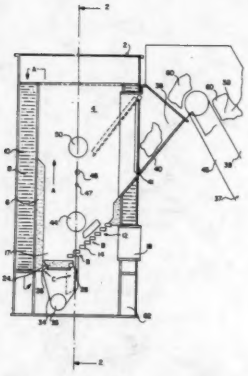
a temperature sensor;

a burner at a lower part of the combustion chamber;

means for supplying fuel to the burner;

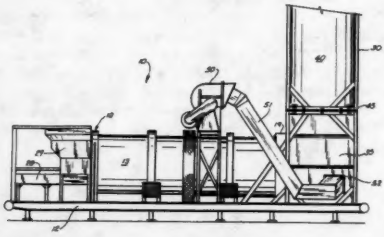
said means for supplying fuel being adjustable in response to the temperature sensed by the temperature sensor to main-

tain the inside of the combustion chamber at a temperature sufficient for the incineration of the waste material;
a water cooled jacket surrounding the combustion chamber;
a trap door situated at a lower part of the combustion chamber; and



means for causing air for combustion to pass upwardly past the trap door while the trap door is closed and to open the trap door for removing ash from the combustion chamber periodically when required.

4,976,210
METHOD AND APPARATUS FOR TREATING HAZARDOUS WASTE MATERIALS
Jack J. Dewald, 7323 W. Roadway, New Orleans, La. 70124
Filed Mar. 29, 1990, Ser. No. 502,516
Int. Cl.[5] A47J *36/00, 36/24*
U.S. Cl. 110—246 **25 Claims**



1. An improved hazardous waste disposal system for incinerating waste material while minimizing gaseous emissions generated during combustion comprising:
(a) a frame;
(b) a rotary kiln having a material inlet and a material outlet mounted on the frame and extending along the frame in a generally horizontal position, the kiln being inclined so that waste material is transported from the inlet to the outlet as the kiln rotates;
(c) primary burner means for elevating the temperature within the kiln for combustion of waste material, the burner means for atomizing fuel within the burner;
(d) a second frame separable from the first frame and adapted to connect to the first frame when the first frame and rotary kiln are generally horizontally positioned, and the second frame generally vertically positioned;
(e) a scrubbing tower carried by the second frame, and having an elongated vertical scrubber chamber that extends during use upwardly from the material outlet end portion of the kiln;
(f) secondary burner means for transferring heat to material and gases that exit the material outlet of the kiln;
(g) vane means for rotating air flow within the tower vertical chamber, about the vertical axis of the vertical chamber;
(h) a vertically spaced plurality of conical members placed in the vertical chamber above the vanes means, at least some of which are of variable diameter; and
(i) liquid spray means for spraying water into the vertical chamber at a position above the conical members

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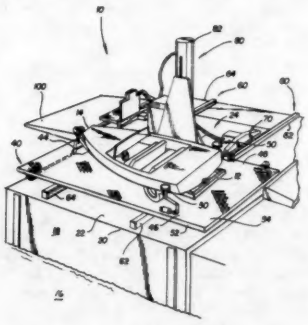
4,976,211
BOAT LAUNCHING SYSTEM
Lloyd C. Reinhardt, 35398 Hunt Club Rd., Gurnee, Ill. 60031
Continuation of Ser. No. 91,089, Aug. 31, 1987, abandoned. This application Dec. 12, 1988, Ser. No. 283,202
Int. Cl.[5] B63C *1/06*
U.S. Cl. 114—44 **7 Claims**



1. A system for launching a boat from a substantially horizontal surface which is elevated above a body of water, said system comprising:
a boat cradle trailer;
a platform member constructed and arranged to support said boat cradle trailer;
means for securing said boat cradle trailer to said platform member;
means for moving said platform member along the substantially horizontal surface in a direction substantially perpendicular to the edge of the substantially horizontal surface to a position over the body of water;
a vertically mounted linear movement device for moving said platform ember substantially vertically from the level of the substantially horizontal surface to a level sufficiently beneath the surface of the body of water to enable the boat to float away from said boat cradle trailer;
said means for moving said platform member substantially vertically from the level of the substantially horizontal surface being located above the surface of the body of water.

4,976,212
PORTLIGHT FOR WATER CRAFT
Richard J. Camarota, Holland, Mich., assignor to ITC Incorporated, Zeeland, Mich.
Filed Apr. 26, 1989, Ser. No. 343,524
Int. Cl.[5] B63B *19/00*
U.S. Cl. 114—178 **12 Claims**

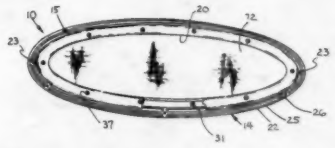
1. A portlight for installing at an opening in a wall of a boat, comprising:

an interior frame surrounding an open viewing area, said interior frame comprising an axially extending spigot for outward insertion in an opening in a wall of a boat and an interior flange extending radially outward from said spigot to overlap the interior face of the wall of the boat;

an exterior frame surrounding said open viewing area and radially overlapping said spigot and the exterior face of the wall of the boat;

physical obstruction means fixed to and spanning the open viewing area therethrough said interior frame and therewith preventing an installer from reaching through said opening in said wall;

plural fastener means for fixedly clamping, between said interior flange and exterior flange, the rim of the opening in the wall of the boat;



temporary fixing means comprising a pair of holes through said interior flange and widely spaced circumferentially therealong and first screws directed exteriorly through said holes for biting into the adjacent wall of the boat and thereby temporarily fixing said interior flange on the wall of the boat to allow a single installer to install the portlight on a boat;

final fixing means comprising plural circumferentially adjacent through holes in said exterior frame opposing corresponding thread engaging holes in the exterior face of said interior frame and second screws directed interiorly through said holes in said exterior frame and into said opposing thread engaging holes in said interior frame to install said exterior flange and thereby clamp said exterior flange and interior flange on the rim of the opening in the wall of the boat.

4,976,213

SECURING TUBES IN INFLATABLE BOATS

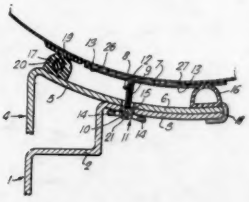
Norman C. Smith, Carisbrooke, England, assignor to Galt Composites Limited, Melksham, England

Filed Apr. 21, 1989, Ser. No. 341,208

Claims priority, application United Kingdom, Apr. 22, 1988, 8809556

Int. Cl.[5] B63B *7/00*

U.S. Cl. 114—345 **8 Claims**



8. A method of releasably securing an inflatable buoyancy tube to the hull of a rigid inflatable boat comprising the steps of:

in a deflated condition of the tube, passing free ends of individual flexible tags permanently attached along the length of the tube through respective apertures in a flange projecting from gunwhale portions of the hull whereby the tube is positioned at one face of the flange and the free ends of the tags at a second face of said flange opposite to said one face,

altering the attitude of stop means permanently attached at said free ends for engaging said flange so that said stop means cannot repass through said apertures, and

inflating said tube, thereby drawing said tag through said aperture in a direction substantially perpendicular to said flange and engage said stop mean against said second face of said flange adjacent said aperture.

4,976,214

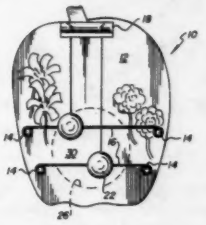
DOOR HARPS

Robert A. Taylor, 1180 High Valley Dr., Pigeon Forge, Tenn. 37863

Filed Sep. 13, 1989, Ser. No. 406,532

Int. Cl.[5] G08B *21/00*; G10D *1/00*

U.S. Cl. 116—100 **7 Claims**



1. A door harp comprising:

(a) a body of one-piece wood board construction;

(b) said body having a substantial thickness and having a face and a back;

(c) said back having a hollowed out cavity therein, leaving a relatively thin sounding board between said cavity and said face, said cavity having a side wall and a bottom wall;

(d) at least two spaced apart pegs attached to said body and extending outwardly from said front face;

(e) at least one string extending between said peg;

(f) said at least one string being spaced from said face;

(g) said pegs being located outside said cavity's perimeter;

(h) said string extending across said cavity;

(i) a chime ball;

(j) a chime ball supporting bracket attached to said body;

(k) flexible support means connecting said chime ball to said bracket and suspending said chime ball therefrom and swinging pendulum fashion to a location at which said chime ball may strike said string;

(l) said string being under tension to create a resonant sound when struck by said chime ball;

(m) a groove coextensive with the side wall of the cavity and extending from the bottom wall of the cavity toward the face further defining said sounding board.

4,976,215

DOOR ACTIVITY MONITORING APPARATUS

William C. Lee, and Irene H. Lee, both of 1001 Carpenters Way, #B-302, Lakeland, Fla. 33809

Filed Apr. 10, 1989, Ser. No. 335,303

Int. Cl.[5] G08B *13/08*

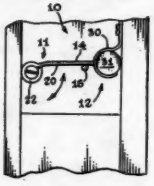
U.S. Cl. 116—215 **3 Claims**

1. A door activity monitoring apparatus in combination with a door assembly including a door jamb and a door having a door handle wherein the monitoring apparatus comprises:

a pivoted signal unit having means for attaching the signal unit to the door jamb proximate the hinged portion of the door that is furthest from the door handle; wherein, the pivoted signal unit includes: an elongated indicator mem-

ber fabricated from magnetically attractive material pivotally secured at one end to a mounting plate member.

a support post projecting outwardly from the mounting plate member for temporary support of a second end of the indicator member; a pivot member including an elongated pivot rod and an enlarged cap; wherein, the pivot rod of the pivot member is operatively attached to the mounting plate member and the indicator member; and wherein, said one end of the indicator member is dimensioned to be loosely received on the elongated pivot rod intermediate the mounting plate member and the enlarged



cap; such that the indicator member is laterally translatable relative to the mounting plate member and support post; and,

a stationary magnetic keeper unit operatively attached to the door proximate the location of the pivoted signal unit; wherein, the magnet keeper unit includes a ferro-magnetic member that will magnetically attract and laterally displace the indicator member relative to the mounting plate member and support post while the door is closed relative to the door jamb such that the opening of the door relative to the door jamb will allow the indicator to drop by gravity into a door activity signal position.

4,976,216

APPARATUS FOR VAPOR-PHASE GROWTH

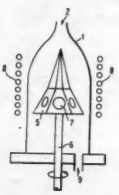
Takayoshi Maeda, Mie; Masahiko Hata, Osaka; Yasunari Zempo, Osaka; Noboru Fukuhara, Osaka, and Hiroaki Takata, Osaka, all of Japan, assignors to Sumitomo Chemical Co., Ltd., Osaka, Japan

Filed Nov. 10, 1988, Ser. No. 269,348

Claims priority, application Japan, Nov. 11, 1987, 62-285938

Int. Cl.[5] C23C *16/00*

U.S. Cl. 118—728 **4 Claims**



1. An apparatus for growing a semiconductor film in a substrate vapor-phase growth, comprising:

a reactor having an inlet for the introduction of a gas containing a source material into a top portion thereof and a susceptor provided in the downstream portion of the reactor, said susceptor having a conical or polygonal pyramidic shape consisting of an upper rectifying portion and a lower substrate holding portion adapted to hold said substrate, the diameter of the lower portion increasing by a greater degree than in the upper portion.

4,976,217

EPITAXY REACTOR HAVING AN IMPROVED GAS COLLECTOR

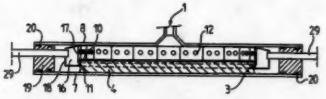
Peter Frijlink, Crosne, France, assignor to U.S. Philips Corporation, New York, N.Y.

Filed Sep. 26, 1989, Ser. No. 412,965

Claims priority, application France, Oct. 14, 1988, 88 13565

Int. Cl.[5] C23C *26/00*

U.S. Cl. 118—733 **6 Claims**



1. An epitaxy reactor comprising a space containing a platform supporting semiconductor wafers with a circulation of gas between the center and the periphery of the platform, which space is closed by a cover which is substantially flat and is parallel to the platform during operation, while a gas-collecting crown comprises a baffle plate, which surrounds the platform and is provided with inlets regularly distributed along the periphery of the platform, characterized in that the baffle plate comprises a high part and a low part, the lower edge of the high part being pressed against the upper edge of the low part such that two parts are capable of sliding motion, while elastic means tend to cause the high part to rise with respect to the low part in order to press this part against the cover.

4,976,218

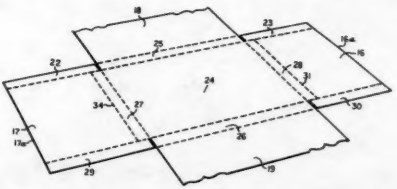
PREPACKAGED, DISPOSABLE, CAT LITTER BOX

Salvatore Cirami, 12-21 35th Ave., Apt. 4F, Long Island City, N.Y. 11106

Filed Dec. 26, 1989, Ser. No. 456,356

Int. Cl.[5] A01K *67/00*

U.S. Cl. 119—168 **5 Claims**



1. A normally folded disposable cat litter box that when unfolded for use has a central portion of its side panels leaning outwardly and thereby provides adequate clearance for a cat to move about within the box although the bottom of the box has minimum width; comprising:

a cardboard box at least an interior surface of which is waterproof, having

a rectangular bottom having a length greater than its width,

first and second side panels extending the length of and permanently joined to said bottom on opposed longitudinally extending borders thereof,

first and second end panels extending the width of and permanently joined to said bottom on opposed laterally extending borders thereof;

said side and end panels rising upwardly from said bottom to respective given heights and each having a free edge,

each side panel having a pair of diagonal fold lines formed thereon which divide the side panel into two wing portions between which a central portion of the side panel extends, said bottom and thereby each side panel having a length great enough that its wing portions are separated so that its central portion has a free edge, and,

the wing portions of opposed side panels permanently joined to the nearest end panel so that an open-top box is formed having closed corners;

said box being normally in folded condition as recited below and unfolded only during its period of use;

said end panels being folded inwardly toward each other, over, parallel and lying nearest to said bottom, the end panels being folded on mutually parallel lateral fold lines which are also parallel to said bottom;

said side panels being folded inwardly toward each other, over, and lying flat against the folded end panels, the side panels being folded on mutually parallel longitudinal fold lines which are also parallel to said bottom;

the longitudinal and lateral fold lines being located in a common plane and intersecting at said corners;

each wing portion being folded simultaneously (i) on a vertical fold line that corresponds to one corner of the box and allows said one corner to be folded outside inward and (ii) on its diagonal fold line, each diagonal fold line having its origin at the intersection of a corner's vertical fold line with a longitudinal fold line and bisecting the angle defined by said intersection;

the wing portions of each side panel being folded under the central portion of the side panel so that the wing portions are pressed between the central portion and the folded end panels, the wing portions thereby acquiring a fold bias that causes the central portion of each side panel to lean outwardly when all the panels are unfolded.

4,976,219

ANIMAL SHIPPING CONTAINER

George Goguen, Cambridge, and Shelley C. Norton, Boston, both of Mass., assignors to Habistat Corporation, Boston, Mass.

Filed Dec. 1, 1988, Ser. No. 278,670
Int. Cl.[5] A01K *15/00*
U.S. Cl. 119—15 **7 Claims**

1. A container for containment and shipment of laboratory-type animals, comprising:

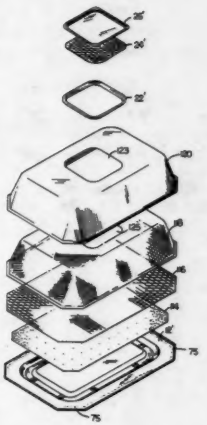
a base portion, and

an upper portion,

said base portion and said upper portion, when assembled, defining a volume for receiving one or more laboratory animals therewithin,

said base portion defining an animal restraining barrier and comprising an outer element of liquid impermeable material said base portion, lying substantially in a single plane,

said upper portion comprising an upper wall disposed generally parallel to a plane of said base portion in assembled state, and a side wall extending about the perimeter of said upper wall, between said upper wall and said base portion, said side wall, about at least a segment of the perimeter of said upper wall, lying at a substantial incline, the intersection of said side wall with said segment of the perimeter of the upper wall lying inwardly of the intersection of said side wall with said base portion, thereby providing a channel in said side wall, generally above the plane of the base portions for flow of air between adjacent stacks of said containers, said upper portion further comprising at least one wall of material adapted for passage of air therethrough,



said upper portion constructed in a manner for stacking a plurality of said containers, and

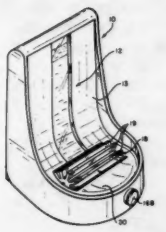
said upper wall including an aperture within, the upper wall for placement and removal of animals in said volume.

4,976,220

SPLASH-FREE CONTROLLED ACCESS WATER SUPPLY APPARATUS FOR ANIMALS

Lennie Gershman, 10853 Rose Ave., #55, Los Angeles, Calif. 90034

Continuation-in-part of Ser. No. 171,786, Mar. 22, 1988, Pat. No. 4,844,014. This application Sep. 11, 1989, Ser. No. 374,962
The portion of the term of this patent subsequent to Jul. 4, 2006, has been disclaimed.
Int. Cl.[5] A01K *31/00*
U.S. Cl. 119—18 **13 Claims**



1. A splash-free, portable water supply apparatus for animals comprising:

a vertically extending water tank having an opening at one end for communicating with a water reservoir region;

said water tank being sealed at the top and having a bottom wall which defines a filler aperture accessible through a removable closure;

said apparatus including a drinking trough area having a local water reservoir region associated therewith;

said water tank providing a pressure gradient by which controlled amounts of water are delivered to said water reservoir and said drinking trough;

said water tank extending to a height substantially above the top of said drinking trough area, and said opening being

located at an elevation below the top of said drinking trough area, whereby the height of the water in said trough area is continuously regulated to substantially fill said trough area without overflowing; and

all of the water in said tank being in direct communication with said local reservoir through said opening, with no obstructions or moving parts therebetween.

4,976,221

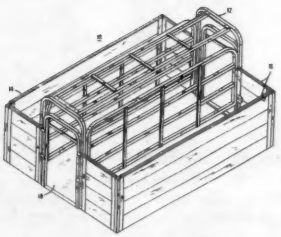
FACILITY FOR LIVESTOCK, FOWL AND OTHER ANIMALS

Lloyd E. Yetter, Box 97, Colchester, Ill. 62326

Filed Jul. 28, 1987, Ser. No. 78,643

Int. Cl.[5] A01K *1/02*

U.S. Cl. 119—20 **48 Claims**



10. In a farrowing crate, the improvement comprising:

a flooring panel including:

a plurality of slotted cross members, each having a plurality of correspondingly located slots;

a plurality of extruded longitudinal members received in said plurality of corresponding slots of said cross members;

said longitudinal members and said slots shaped for engagement of one by the other; and

locking means or locking said longitudinal members in said slots relative to said cross members,

said locking means comprising a protrusion from a wall of one of an engaging pair of said slots and longitudinal members and a corresponding notch in a wall of the other of the engaging pair of said slots and longitudinal members,

said locking means further comprising a second protrusion and a second notch formed in opposite walls of said other of said engaging pair of said slots and longitudinal members and said one of said engaging pair,

said locking means thereby operable for locking said longitudinal members in said slots within said cross members.

4,976,222

HORSE FEEDER

Jeffery V. Cooke, P.O. Box 2659, Paso Robles, Calif. 93447

Filed Jun. 26, 1989, Ser. No. 371,376

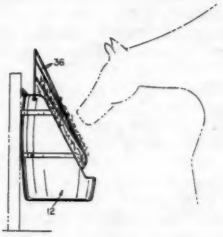
Int. Cl.[5] A01K *1/10*

U.S. Cl. 119—60 **3 Claims**

1. A feeder for horses and other grazing animals, comprising:

a receptacle having a back portion and a front portion, the height of the back portion exceeding the height of the front portion, said receptacle being open at its top and front; and,

a grille sloping downwardly and forwardly, spanning the open front of said receptacle, said grille having a top portion located above the top of the back portion of said receptacle so that a space exists between the top portion of said grille and the top of the back portion of said receptacle, whereby feed can be loaded into the feeder from the rear through the space.



4,976,223

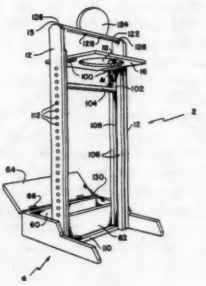
ADJUSTABLE ANIMAL FEEDING APPARATUS

Wesley L. Pierce, 12714 Melville La., Fairfax, Va. 22033, assignor to Wesley L. Pierce and Donna E. Saul, Fairfax, Va.

Filed Sep. 9, 1988, Ser. No. 242,692

Int. Cl.[5] A01K *5/01*

U.S. Cl. 119—61 **13 Claims**



1. An adjustable animal feeder comprising:

a support base having a front and rear side;

at least two arms extending upwardly from said base, each of said at least two arms having guideways along the length thereof;

a vertically adjustable support plate operatively connected to each of said at least two arms, said support plate having a generally flat top surface with an opening defined therein;

means on said support plate for interengaging with said guideways whereby said support plate can be moved along the length of said at least two arms to a selected vertical position;

a dish detachably insertable into said opening in said support plate for receiving one of food and water therein;

means for locking said support plate at the selected vertical position, said vertical position being selected to accommodate height of an animal which is to feed or drink from said dish, said means for locking being operatively connected to said means for interengaging; and

a compartment on the rear side of the support base, said support plate extending between said at least two arms and projecting toward the front side of the support base, said compartment acting as a counterbalance to downward forces applied to the support plate whereby said

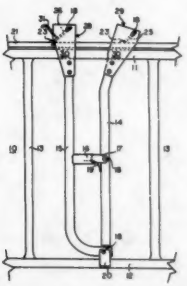
support base with the compartment prevents the feeder from tipping over when an animal feeds therefrom.

4,976,224

DOUBLE HINGED CATTLE STANCHION APPARATUS

John Hatfield, 1823 Shoestring Rd., Gooding, Id. 83330

Filed Apr. 26, 1990, Ser. No. 514,759
Int. Cl.[5] A01K *1/06*
U.S. Cl. 119—148 **3 Claims**



1. In a cattle stanchion apparatus having a top rail, a bottom rail, a plurality of fixed stanchions being attached to and between the top rail and the bottom rail and an actuator rod being rotatably and slidably attached along the top rail, the improvement which comprises:

a plurality of pairs of first and second release stanchion couplers being attached in spaced relation one to the other along the length of the actuator bar and positioned to locate release stanchions and fulcrum stanchions in an open timid cow position, a standard self locking position, a closed position, a downed cow release position or a neutral position;

a fulcrum stanchion having a "J" shaped lower end being pivotally attached at its lower end to the bottom rail between two adjacent fixed stanchions;

a release stanchion being pivotally attached approximately at its center point to an approximate center point on said fulcrum stanchion;

a pair of stanchion heads, one being attached to an upper end of said fulcrum stanchion and one being attached to said release stanchion, each of said stanchion heads including a safety release housing having a pair of vertical opposing side walls, said housing being disposed to receive and encompass the top rail and the actuator rod;

a catch tang being pivotally attached between the opposing side walls of the stanchion head attached to said release stanchion and disposed to engage a first coupler on the actuator bar thereby preventing the release stanchion from pivoting into an open position when the actuator rod is in a closed position; and

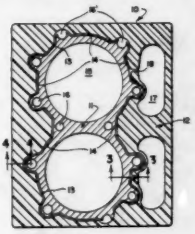
a stop dog, including a trigger release member, being pivotally attached at an upper end between the opposing side walls of the stanchion head attached to said fulcrum stanchion and having a lower end including an actuator rod cutout therein being engaged with said actuator rod and a second release stanchion coupler thereby preventing said fulcrum stanchion from pivoting into an open position when the actuator rod is in the closed position.

4,976,225

CYLINDER HEAD GASKET FOR AN INTERNAL COMBUSTION ENGINE

John H. Stang; Christine H. Moore, and Rien Ouwerkerk, all of Columbus, Ind., assignors to Cummins Engine Company, Inc., Columbus, Ind.

Filed Dec. 11, 1989, Ser. No. 448,727
Int. Cl.[5] F02B *75/18*
U.S. Cl. 123—41.74 **6 Claims**



1. A cylinder head gasket for disposition between adjacent surfaces of a block having a plurality of cylinders formed therein and a cylinder head of an internal combustion engine, the gasket being adapted to be compressed therebetween upon a predetermined torque being applied to a plurality of relatively spaced fastening means of the engine, the fastening means retaining the head and block in assembled relation; said gasket comprising a single first section of relatively hard gasket material and having an area for simultaneously overlying portions of the block surface circumjacent ends of the cylinders formed therein, the block surface portions being exposed to combustion temperatures and pressures when the engine is operating; a single second section of relatively soft gasket material disposed in spaced encompassing relation with respect to the periphery of said first section and coacting therewith to form a narrow gap substantially coinciding with the peripheral configuration of said first section; and means disposed at predetermined locations within said gap for effecting interconnection between said sections during initial placement of the gasket between the head and block.

4,976,226

METHOD FOR INCREASING THE HEAT EFFICIENCY OF A PISTON COMBUSTION ENGINE

Zdenek Herman, Praskolesy, Czechoslovakia, assignor to CKD Praha, Kombinat, Czechoslovakia

Filed Jul. 11, 1989, Ser. No. 378,139
Int. Cl.[5] F02B *75/02*
U.S. Cl. 123—64 **4 Claims**

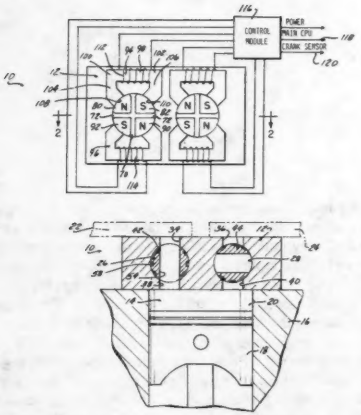
1. Method for increasing the heat use efficiency of a piston combustion engine, comprising:

operating the engine through a working cycle comprising at least one stroke of contraction of the engine cylinder followed by one subsequent stroke of expansion of the engine cylinder, wherein heated combustion products are produced in the engine cylinder during the working cycle;

after the working cycle, operating the engine through a subsequent steam-gas cycle comprising: compressing the combustion products in the engine cylinder in a compression stroke and then expanding the engine cylinder in an expansion stroke injecting water into the cylinder toward the end of the final expansion stroke of the working cycle and during the subsequent compression stroke of the steam-gas cycle for transmitting heat that accumulated in the walls of the combustion space of the engine during the working cycle into the cooled and compressed combustion products and into the preheated water mist which are

expanding together with steam created by the injection of water.

4,976,227
INTERNAL COMBUSTION ENGINE INTAKE AND EXHAUST VALVE CONTROL APPARATUS
David J. Draper, 8640 Heathersett, Brighton, Mich. 48116
Filed Apr. 16, 1990, Ser. No. 509,882
Int. Cl.[5] F01L *7/00*; F16K *31/02*
U.S. Cl. 123—80 R **10 Claims**



1. An intake and exhaust valve control apparatus for an internal combustion engine having a reciprocal piston mounted in a cylinder, the apparatus comprising:

a body mountable on the engine, the body having inlet and outlet ports extending therethrough disposed in fluid flow communication with the cylinder in the engine;

first and second horizontally extending through bores formed in the body, the first through bore intersecting the inlet port, the second through bore intersecting the exhaust port in the body;

first and second valves rotatably mounted in the first and second through bores, respectively, each of the first and second valves having a through bore extending therethrough substantially perpendicular to the axial length of the valve;

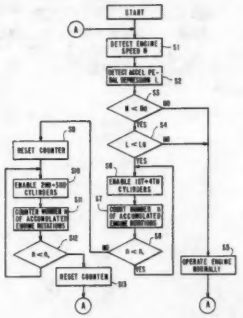
magnet means of opposed polarity mounted on one end of each of the first and second valves;

magnetic core means mounted on the body and disposed in magnetic coupled relationship with the magnet means;

a coil mounted on the magnetic core means for inducing a magnetic field in the magnetic core when electric current flows through the coil; and

control means, connected to the coil, for generating an electric current in the coil of one of two opposed directions, for inducing a magnetic field in the magnetic core having one of first and second magnetic field orientations to cause selective rotation of the magnet means and the first and second valve means between first and second positions in which the through bore in each of the first and second valve means alternates between fluid flow communicating and fluid flow blocking positions between the inlet and outlet ports in the body.

4,976,228
VALVE CONTROL SYSTEM FOR INTERNAL COMBUSTION ENGINE
Hideo Kawamura, Samukawa, Japan, assignor to Isuzu Motors Limited, Tokyo, Japan
Filed Oct. 13, 1989, Ser. No. 420,953
Claims priority, application Japan, Oct. 31, 1988, 63-275308
Int. Cl.[5] F02B *77/00*; F01L *9/04*
U.S. Cl. 123—90.11 **4 Claims**



1. A control system for controlling intake and exhaust valves of an internal combustion engine, comprising:

electromagnetic actuator means for opening and closing the intake and exhaust valves;

control means for applying drive signals to said electromagnetic actuator means;

an engine speed sensor for detecting rotational speed of the internal combustion engine;

an accelerator pedal movement sensor for detecting the amount of depression of an accelerator pedal which controls a load on the internal combustion engine;

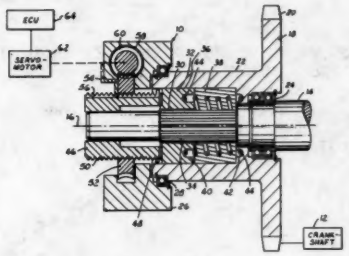
cylinder control means for determining that the internal combustion engine is idling and cutting off drive signals to the electromagnetic actuator means for selected cylinders of the internal combustion engine when the engine speed based on a detected signal from said engine speed sensor is lower than a preset speed and the amount of depression of the accelerator pedal based on a detected signal from said accelerator pedal movement sensor is smaller than a present amount; and

modifying means for modifying the cylinders for which the drive signals are cut off by said cylinder control means, depending on a rotational speed of the internal combustion engine.

4,976,229
ENGINE CAMSHAFT PHASING
Herbert N. Charles, Chatham, Canada, assignor to Siemens Automotive L.P., Troy, Mich.
Filed Feb. 12, 1990, Ser. No. 478,797
Int. Cl.[5] F01L *1/34*
U.S. Cl. 123—90.17 **10 Claims**

1. In an internal combustion engine having a crankshaft that is operated by one or more reciprocal cylinder pistons, a camshaft that is driven by the crankshaft to operate one or more cylinder valves, and an electromechanical phasing mechanism for setting the phase of the camshaft relative to that of the crankshaft within a range of relative phases to obtain a desired phasing of cylinder valve operation relative to that of the crankshaft, the improvement in said phasing mechanism which comprises an input member that is driven by the crankshaft to rotate about the camshaft axis, a ring that is coaxial with said input member and couples the rotation of said input member to the crankshaft, said ring having a radially outer spline and a

radially inner spline, one of said splines being in mesh with a mating spline on said input member to form a first set of mating splines and the other of said ring's splines being in mesh with a mating spline on the camshaft to form a second set of mating splines, said first and said second sets of mating splines having different pitches, and means for setting the axial position of said ring relative to the camshaft and to said input member over a range of axial positions to cause, via the actions of said first and



second mating spline sets, the phase of the camshaft to be set to a desired relationship to that of said input member, and hence to that of the camshaft, within said range of relative phases, in which said means for setting the axial position of said ring relative to the camshaft and to said input member comprises the combination of a mandrel and a spring that are arranged to axially capture said ring, said mandrel being positionable along the camshaft axis.

4,976,230

VALVE MECHANISM, PREFERABLY FOR AN INTERNAL COMBUSTION ENGINE, HAVING PRESSURE MEDIUM SUPPLY PASSAGE

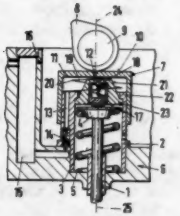
Dieter Voigt, Wolfsburg, Fed. Rep. of Germany, assignor to Volkswagen AG, Wolfsburg, Fed. Rep. of Germany

Filed May 15, 1990, Ser. No. 523,864

Claims priority, application Fed. Rep. of Germany, May 16, 1989, 3915841

Int. Cl.[5] F01L *1/24, 1/10*

U.S. Cl. 123—90.49 **5 Claims**



1. A valve mechanism preferably for an internal combustion engine, comprising a valve having a stem, a valve spring surrounding the valve stem, a stationary guide sleeve at least partially enclosing the valve spring, a cup plunger axially displaceable on the stationary guide sleeve and having a contact surface for a valve drive cam, and a pressure medium supply passage unilaterally incorporated in the wall of the guide sleeve to supply pressure medium for controlling the distance between the plunger contact surface and the free end of the valve stem, the wall thickness of the guide sleeve being smaller on the side away from the supply passage than in the region containing that passage.

4,976,231

CURVED INTAKE DUCT HAVING IMPROVED FLOW CHARACTERISTICS

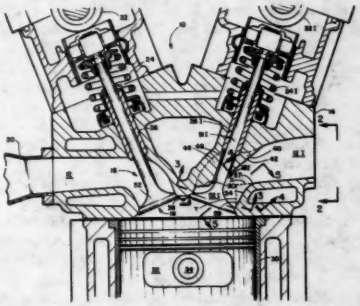
James J. Feuling, 4035 N. Ventura Ave., Ventura, Calif. 93001

Division of Ser. No. 227,472, Aug. 1, 1988, Pat. No. 4,838,219.

This application May 22, 1989, Ser. No. 356,017

Int. Cl.[5] F02F *1/00*

U.S. Cl. 123—188 M **20 Claims**



1. In a device using a curved intake duct having a radius of curvature and extending between an upstream end and a valve port which leads into a cylinder; an intake valve means actuated by a cam, said intake valve means including a cylindrical valve stem which extends through said curved intake duct from said cam between the upstream end and said intake port; a valve head conforming to said intake valve port; and an improved fluid flow path through said curved intake duct comprising:

a first fairing, having a width approximately the same as the diameter of said valve stem, with an upstream and downstream end, which is positioned intermediate said upstream end of said duct and said valve stem, the downstream end of said first fairing located closely adjacent to said valve stem, said end of said first fairing adjacent to said valve stem being curvilinear.

4,976,232

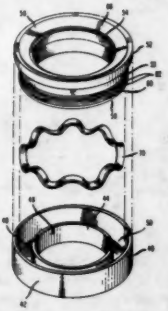
VALVE SEAL FOR ROTARY VALVE ENGINE

George J. Coates, 2500 Belmar Blvd., Wall Township, Monmouth County, N.J. 07719

Filed Dec. 6, 1989, Ser. No. 446,868

Int. Cl.[5] F01L *7/16*

U.S. Cl. 123—190 E **7 Claims**



1. A valve seal for a rotary valve assembly for use in internal

combustion engines of the piston and cylinder type, said rotary valve assembly positioned within a two-piece cylinder head, said cylinder head defining a plurality of drum accommodating cavities for receipt of a plurality of rotary intake valves and rotary exhaust valves, said rotary intake valves and said rotary exhaust valves having a spherical section defined by two parallel planes of a sphere, said planes being disposed symmetrically about the center of said sphere, defining a spherical periphery and planer end walls, said rotary intake valves and said rotary exhaust valves mounted on a shaft means within said drum accommodating cavities in gas-tight sealing contact with an inlet port and an exhaust port respectively, said rotary intake valves and said rotary exhaust valves having passageways therethrough for the introduction and interruption of fuel/air mixture to the engine and the evacuation of exhaust gases from the engine respectively, said gas-tight sealing contact of said rotary intake valve and said rotary exhaust valve with said intake port and said exhaust port, respectively, accomplished by a valve seal comprising:

a receiving ring, substantially circular in cross sectional area having defined therein, an annular receiving groove, said receiving ring engageably secured in said cylinder head about said inlet port said exhaust port, said receiving ring having an aperture therethrough coincidental with said inlet port or said exhaust port;

a contact ring removably securable within said annular receiving groove of said receiving ring, said contact ring having a curved upper surface conforming to said spherical periphery of said intake valve or said exhaust valve, said contact ring having an aperture therethrough coincidental with said aperture of said receiving ring and said inlet port or said outlet port;

a spring bias means positioned in said annular receiving groove of said receiving ring, positioned below said contact ring and exerting upward pressure on said contact ring;

a sealing means positioned about said contact ring in contact with said outer wall of said annular receiving groove;

a communicating passageway between said inlet port or said outlet port and said sealing means secured to said contact ring.

4,976,233

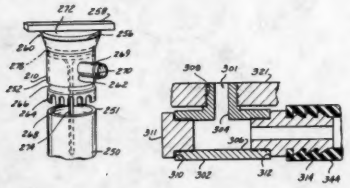
QUICK CONNECT COUPLING ADAPTERS FOR FACILITATING SIMPLE AND HIGH SPEED OIL CHANGE IN AN INTERNAL COMBUSTION ENGINE

Ram D. Bedi, and Andrianus J. van der Griendt, both of Birmingham, Mich., assignors to K.J. Manufacturing, Wixom, Mich.

Continuation-in-part of Ser. No. 413,008, Sep. 26, 1989, and a continuation-in-part of Ser. No. 350,303, May 11, 1989, Pat. No. 4,884,660. This application Mar. 7, 1990, Ser. No. 490,082

Int. Cl.[5] F01M *1/00*

U.S. Cl. 123—196 R **26 Claims**



1. An adapter system for facilitating rapid, efficient and effortless oil change in an internal combustion engine having at least one engine oil inlet opening, the adapter system comprising at least one oil filler adapter insertable in the one engine oil inlet opening, said oil filler adapter comprising:

(a) a central oil conveying conduit having an inlet, an outlet and a connecting passage therebetween;

(b) a filling hose having a first end attached to said inlet and a second end having a quick connect coupling member attached thereto; said quick connect coupling member releasably attachable to a fill point on an external pump device; and

(c) means for sealingly attaching said outlet of said central oil conveying body to the associated engine oil inlet opening.

4,976,234

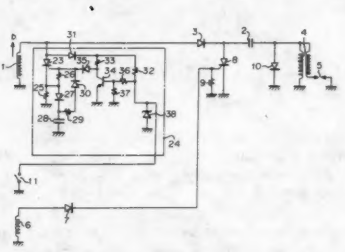
INTERNAL COMBUSTION ENGINE STOP DEVICE

Hiroshi Okuda, Himeji, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Nov. 7, 1989, Ser. No. 432,840

Int. Cl.[5] F02B *77/00*

U.S. Cl. 123—198 DC **3 Claims**



1. An internal combustion engine stop device comprising:

a power generation winding (1) for generating electric power corresponding to the rotation of an engine to charge a capacitor (2) for an ignition coil (4);

a self-reset type stop switch (11) having normally opened contacts;

a self-holding circuit (24) including a shunting thyristor (23) and a triggering capacitor (28) coupled to a gate of the thyristor for short-circuiting the output of the power generation winding and for holding the winding in a short-circuited state in response to a momentary closure of the stop switch; and

malfunction prevention means arranged between the stop switch and the power generation winding for preventing leakage current across the stop switch from charging the triggering capacitor and attendantly preventing the erroneous gating of the thyristor and the shut down of the engine.

4,976,235

APPARATUS AND METHOD TO CONTROL EXTRACTION OF LUBRICATING OIL

Maurice R. Commanday, 1401 Via Gabriel, Palos Verdes Estates, Calif. 90274

Filed Nov. 6, 1989, Ser. No. 431,987

Int. Cl.[5] F01M *1/00*

U.S. Cl. 123—196 R **13 Claims**

1. Apparatus of the character described for extracting lubricating oil from an engine crankcase sump via an oil level dipstick tube associated with the engine, and extending to near the bottom of the sump, comprising, in combination with the sump and dipstick tube,

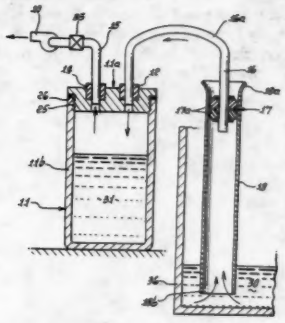
(a) an oil extraction tube extending downwardly in said dipstick tube for extracting oil from the sump, the extraction tube having a lower open end proximate the bottom of the sump,

(b) means sealing off between the extraction tube and the dipstick tube proximate the upper end of the dipstick tube,

(c) a sealed container having an inlet port in communication

with said extraction tube for flowing extracted oil into the container, and having an outlet port above the level of oil in the container, and

(d) a vacuum-producing ejector device having an intake port in communication with said outlet port for withdrawing air from the sealed container, creating partial vacuum conditions effective to induce flow of oil via the extraction



tube into the container, said ejector located outside the container,

(e) said extraction tube between the dipstick tube and the container being flexible and exposed to visibly vibrate as oil mixed with air is passed to the container during the extraction of final amounts of oil from the sump, and to cease vibration when oil flow to the container ceases.

4,976,236

FUEL INJECTION PUMP

André Brunel, Genis Laval, France, assignor to Robert Bosch GmbH, Stuttgart, Fed. Rep. of Germany

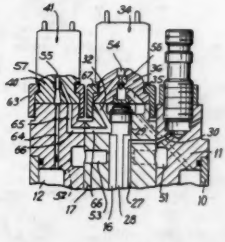
PCT No. PCT/DE88/00353, § 371 Date Nov. 21, 1988, § 102(e) Date Nov. 21, 1988, PCT Pub. No. WO89/00243, PCT Pub. Date Jan. 12, 1989

PCT Filed Jun. 11, 1988, Ser. No. 296,219

Claims priority, application Fed. Rep. of Germany, Jul. 6, 1987, 3722265

Int. Cl.[5] F02M *39/00*

U.S. Cl. 125—300 **17 Claims**



1. A fuel injection pump for an internal combustion engine having at least one injection nozzle, and fuel injection valve comprising:

at least one pump piston confining a pump working space;

first conduit means for communication said pump working space with a fuel supply space for filling said pump working space with fuel during a pump piston intake stroke;

second conduit means for communicating said pump working space with the injection nozzle for delivering a quantity of fuel to the injection nozzle during a pump piston delivery stroke;

a first pilot valve for controlling a quantity of fuel delivered to the injection nozzle; and

means for dividing the quantity of fuel delivered to the injection nozzle into a preliminary fuel quantity and a main fuel quantity, said dividing means comprising:

means for venting a portion of fuel from said pump working chamber during the pump piston delivery stroke, and

a second pilot valve for controlling an amount of fuel vented from said pump working chamber,

cam drive means for reciprocally displacing said pump piston to cause said pump piston to execute the intake and delivery strokes;

said venting means comprising an accumulator space, a control space, an accumulator piston having a first end face for confining said accumulator space and a second end face opposite to said first end face for confining said control space, said fuel injection pump further comprising means for communicating said control space with the fuel supply space and including first means for communicating said control space with said second pilot valve and second means for communicating said second pilot valve with the fuel supply space.

4,976,237

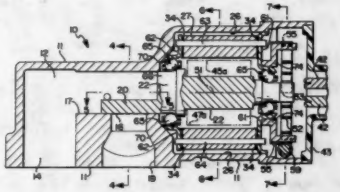
ENGINE AIR INTAKE VALVE

Steven R. Bollinger, Chesterfield, Mo., assignor to Carter Automotive Company, St. Louis, Mo.

Filed Jul. 10, 1989, Ser. No. 377,686

Int. Cl.[5] F02M *23/06*

U.S. Cl. 123—339 **20 Claims**



1. In combination with an internal combustion engine, a system for regulating engine speed by regulating the air flow across a throttle valve in an air intake passage, said system comprising an engine air intake valve and means for sensing an operating variable representative of engine speed and sending an electrical signal representative of the engine speed to said engine air intake valve,

said engine air intake valve comprising a common housing having a first actuator chamber and a second valve chamber,

a rotary electrical actuator mounted in said first chamber, said actuator comprising an electrical rotor,

said second valve chamber defining an air passageway having an inlet on one side of said throttle valve and an outlet on the other side of said throttle valve,

said rotor comprising an axial extension having a cylindrical side surface movable rotationally along a cylindrical surface of said second valve chamber, and

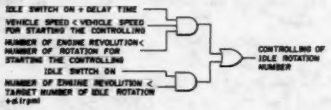
a flow port in said cylindrical side surface of said second valve chamber intermediate the inlet and outlet thereof, the area of said flow port being determined by the rotational position of said axial extension of said rotor across said flow port in response to the electrical signal generated by said sensing means.

4,976,238

APPARATUS FOR CONTROLLING THE NUMBER OF IDLE ROTATIONS OF AN INTERNAL COMBUSTION ENGINE

Katsuhiko Toyoda, Shizuoka, Japan, assignor to Suzuki Jidosha Kogyo Kabushiki Kisha, Shizuoka, Japan

Filed Feb. 9, 1990, Ser. No. 477,618
Claims priority, application Japan, Feb. 21, 1989, 1-41438
Int. Cl.[5] F02M *3/45, 3/00*; F02D *41/16*
U.S. Cl. 123—339 **3 Claims**


IDLE SWITCH ON + DELAY TIME
VEHICLE SPEED < VEHICLE SPEED FOR STARTING THE CONTROLLING
NUMBER OF ENGINE REVOLUTION < NUMBER OF ROTATION FOR STARTING THE CONTROLLING
IDLE SWITCH ON
NUMBER OF ENGINE REVOLUTION ≦ TARGET NUMBER OF IDLE ROTATION +α (rpm)
CONTROLLING OF IDLE ROTATION NUMBER

1. In an apparatus for controlling the number of idle rotations of an internal combustion engine for a vehicle so that the number of engine revolutions becomes a target number of idle rotations, said apparatus starting the controlling of the number of idle rotations when each and every one of a plurality of first conditions is satisfied, said first conditions including the opening degree of an air inlet throttle valve of the internal combustion engine, the vehicle speed, and the number of engine revolutions, the improvement comprising control means for starting the controlling of the number of idle rotations so that the number of engine revolutions becomes the target number of idle rotations irrespective of the absence of satisfaction of each of the first conditions, said control means starting controlling of the number of idle rotations in response to satisfaction of each of the following second conditions: the opening degree of said air inlet throttle valve is an idle opening degree, and the number of engine revolutions drops below a value slightly above the target number of idle rotations after the controlling of the number of idle rotations stops due to the absence of satisfaction of one of said first conditions.

4,976,239

THROTTLE CONTROL SYSTEM WITH NOISE-FREE ACCELERATOR POSITION INPUT

Akio Hosaka, Yokohama, Japan, assignor to Nissan Motor Company, Limited, Yokohama, Japan

Filed Feb. 6, 1985, Ser. No. 698,868
Claims priority, application Japan, Feb. 7, 1984, 59-19366
Int. Cl.[5] F02D *11/10*
U.S. Cl. 123—399 **12 Claims**

1. A throttle control system for an internal combustion engine comprising:

a manually operable means for producing a demand air flow indicative signal;

an intake air flow rate adjusting means for controlling air flow through an air induction passage of the engine, said intake air flow rate adjusting means being responsive to a control signal to adjust the intake air flow rate in accordance therewith;

a controller receiving said demand air flow indicative signal and deriving said control signal according to predetermined characteristics on the basis of said demand air flow rate indicative signal; and

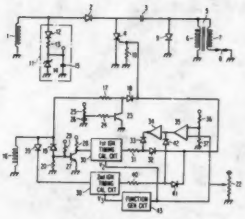
means, cooperative with said controller for providing a first order lag element for deriving said control signal, for removing a frequency range of signal component contained in said demand air flow indicative signal, which frequency range corresponds to a specific frequency range of the vehicle body, before said controller derives said control signal based thereon.

4,976,240

ENGINE IGNITION SYSTEM

Hiroshi Okuda, Himeji, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Oct. 18, 1989, Ser. No. 423,285
Int. Cl.[5] F02P *5/10*
U.S. Cl. 123—406 **2 Claims**



1. An engine ignition system comprising:

a signal coil for generating a first reference signal at an advanced angle and a second reference signal at a start position in synchronization with the rotation of an engine;

a throttle sensor for detecting a throttle opening degree;

a first ignition timing calculation circuit for calculating an ignition timing corresponding to an output signal from said throttle sensor in accordance with said first reference signal when the ignition timing is advanced from a predetermined ignition timing; and

a second ignition timing calculation circuit for calculating an ignition timing corresponding to an output signal from said throttle sensor in accordance with said second reference signal when the ignition timing is retarded from a predetermined ignition timing.

4,976,241

METHOD FOR DETERMINING COMBUSTION CONDITION IN SPARK IGNITION INTERNAL COMBUSTION ENGINE AND COMBUSTION CONDITION CONTROL DEVICE

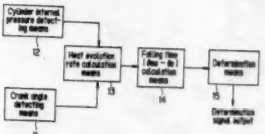
Tetsuro Ishida; Yoshiaki Danno, both of Kyoto; Kazuhide Togai, Takatsuki; Hiromitsu Ando, Okazaki; Daisuke Sanbayashi, Toyota; Masato Yoshida, Kyoto; Kazuhiro Shiraishi, Kyoto; Tokihiro Tsukamoto, Kyoto; Jun Takemura, Toyota, and Eiichi Koujina, Okazaki, all of Japan, assignors to Mitsubishi Jidosha Kogyo Kabushiki Kaisha, Tokyo, Japan

Filed Oct. 12, 1989, Ser. No. 420,811

Claims priority, application Japan, Oct. 13, 1988, 63-255957; Dec. 15, 1988, 63-314950; Feb. 2, 1989, 1-22646; Feb. 2, 1989, 1-22647; Feb. 2, 1989, 1-22648; Feb. 2, 1989, 1-22649; Feb. 2, 1989, 1-22650; Feb. 23, 1989, 1-41528; Feb. 23, 1989, 1-41529; Feb. 23, 1989, 1-44192; Feb. 23, 1989, 1-44193; Feb. 23, 1989, 1-44420

Int. Cl.[5] F02P 5/15, 5/14

U.S. Cl. 123—425 47 Claims



1. A method for determining combustion condition of a spark ignition internal combustion engine comprising a first step for detecting a physical value of combustion varying in association with combustion in a combustion chamber of the spark ignition internal combustion engine, a second step for calculating heat evolution rate from said physical value of combustion detected, and a third step for determining combustion condition from changes in the falling area of the heat evolution rate.

4,976,242

FUEL INJECTION CONTROL DEVICE OF AN ENGINE

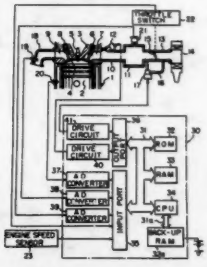
Yukihiro Sonoda; Kouichi Osawa; Hiroshi Kanai; Kouichi Hoshi; Hiroki Matsuoka, all of Susono; Michihiro Ohashi, Mishima, and Hiroshi Sawada, Gotenba, all of Japan, assignors to Toyota Jidosha Kabushiki Kaisha, Toyota, Japan

Filed Jan. 24, 1990, Ser. No. 469,297

Claims priority, application Japan, Jan. 27, 1989, 1-16347

Int. Cl.[5] F02D 41/10, 41/12, 41/14

U.S. Cl. 123—489 29 Claims



1. A fuel injection control device of an engine having an intake passage and an exhaust passage, said device comprising:

an oxygen concentration detector arranged in the exhaust passage and producing an output signal indicating whether an air-fuel mixture fed into the engine is lean or rich;

feedback control means for controlling an amount of fuel fed into the engine in response to the output signal of said oxygen concentration detector to bring an air-fuel ratio of the mixture to a desired air-fuel ratio;

means for detecting an accelerating operation of the engine;

fuel increasing means for increasing the amount of fuel fed into the engine when the accelerating operation of the engine is carried out;

times calculation means determining, on the basis of the output signal of said oxygen concentration detector, whether the air-fuel mixture is lean or rich at a predetermined crankangle during a lean-rich discriminating time when the accelerating operation of the engine is carried out to calculate both times of being lean and times of being rich within said lean-rich discriminating time;

time control means for controlling said lean-rich discriminating time in response to a degree of an acceleration of the engine to shorten said lean-rich discriminating time as said degree of the acceleration of the engine becomes larger;

means for calculating a difference between said times of being lean and said times of being rich; and

correction means for correcting an increase in the amount of fuel, which increase is caused by said fuel increasing means, to increase said increase in the amount of fuel when said times of being lean is larger than said times of being rich and when said difference is larger than a predetermined value, and to reduce said increase in the amount of fuel when said times of being rich is larger than said times of being lean and when said difference is larger than a predetermined value.

4,976,243

INTERNAL COMBUSTION ENGINE CONTROL SYSTEM

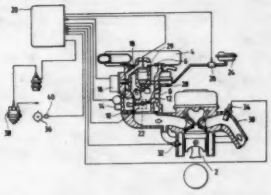
Yukinori Sano; Mineo Kashiwaya, and Yuuji Ikeda, all of Katsuta, Japan, assignors to Hitachi, Ltd., Tokyo and Hitachi Automotive Engineering Co., Ltd., Ibaraki, both of, Japan

Filed Oct. 6, 1989, Ser. No. 418,221

Claims priority, application Japan, Oct. 14, 1988, 63-257156

Int. Cl.[5] F02D 41/10, 41/12, 41/18

U.S. Cl. 123—492 6 Claims



1. An engine control system comprising:

means for detecting air flow quantity supplied to an internal combustion engine;

means for detecting throttle valve opening;

means for detecting either acceleration or deceleration;

means for determining an estimated air flow quantity based on the throttle valve opening and the air flow quantity detected by said air flow quantity detecting means after detection of the acceleration or deceleration;

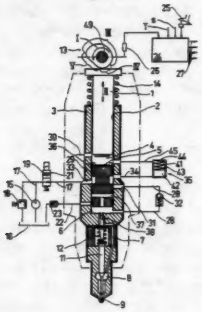
means for controlling the fuel supplied to the engine in response to the estimated air flow quantity of said determining means.

4,976,244

FUEL INJECTION DEVICE FOR INTERNAL COMBUSTION ENGINES, IN PARTICULAR UNIT FUEL INJECTION

Konrad Eckert, Stuttgart, Fed. Rep. of Germany, assignor to Robert Bosch GmbH, Stuttgart, Fed. Rep. of Germany

Filed Oct. 20, 1989, Ser. No. 424,459
Claims priority, application Fed. Rep. of Germany, Dec. 31, 1988, 3844475
Int. Cl.[5] F02M 47/02
U.S. Cl. 123—501 28 Claims



1. A fuel injection device for internal combustion engines, comprising a housing, a cylinder bore (2) in said housing a pump piston (1) in said cylinder bore,

a pump chamber (4) in said cylinder bore related to said pump piston (1) that has a constant working stroke,

an intermediate piston (5) in said cylinder bore, a pressure chamber (6) in said cylinder bore relative to said intermediate piston,

said intermediate piston (5) hydraulically separating said pump chamber (4) from said pressure chamber (6),

a valve needle (11)that controls injection openings (9), a nozzle pressure chamber (8) relative to said valve needle and said injection openings, a pressure line (7) that extends from said pressure chamber (6) to said nozzle pressure chamber (8), a supply onset means for determining an injection onset of fuel for said pressure chamber (6) to said nozzle pressure chamber (8) as a function of a fuel volume containable in said pump chamber (4), for this purpose,

said pressure chamber (6) functioning to pre-store a fuel volume therein for injection of a required supply quantity, via said nozzle pressure chamber (8), a diversion conduit (22) connected to said pressure chamber (6) and to a fuel supply container,

said diversion conduit determining an end of supply by opening a one-way valve therein to permit fuel flow from said pressure chamber (6) near an end of a compression stroke due to movement of said intermediate piston (5), wherein said intermediate piston (5) always attains a predetermined end position at an end of a compression stroke,

a low-pressure fuel source (15), a feed line (17) which can be connected from said low pressure fuel source to a fill line (28) leading to said pressure chamber (6),

a fill valve (32) connected in said fill line (28), a control valve (19) in said feed line (17) for controlling a flow of a fuel volume into the pressure chamber (6) via said feed line (17) and said fill line (28),

a reservoir (35) connected with said pump chamber (4) and connectable with said feed line (17) via said cylinder bore,

said reservoir including a piston (43) separating a reservoir chamber (41) from a control chamber (42),

a compensation line (45) connected from said pump chamber (4) to said reservoir chamber (41) of said reservoir (35) and a control line (34) which leads from said cylinder bore to said control chamber (42),

whereby a volumetric capacity of said reservoir (35) is variable in order to determine an enclosable fuel volume in said pump chamber (4) and thus to define a supply onset, and

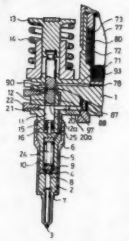
that a volumetric capacity of said reservoir is determined by a stroke of said reservoir piston (43) within said reservoir.

4,976,245

UNIT INJECTOR

Takeshi Takahashi, and Toshiro Itatsu, both of Mishima, Japan, assignors to Toyota Jidosha Kabushiki Kaisha, Toyota, Japan

Filed Sep. 11, 1989, Ser. No. 405,882
Claims priority, application Japan, Sep. 21, 1988, 63-234823
Int. Cl.[5] F02M 39/00, 47/00
U.S. Cl. 123—506 21 Claims



1. A unit injector of an engine, comprising:

a housing having a plunger bore and a nozzle opening;

a plunger reciprocally movable in said plunger bore and driven by engine;

a high pressure fuel chamber formed in said housing and defined by a tip face of said plunger, the pressure of fuel in said high pressure fuel chamber being increased by said plunger;

a fuel supply port open to said high pressure fuel chamber to feed fuel into said high pressure fuel chamber when said plunger is at a fuel compressing operation start position, said fuel supply port being closed by said plunger when a fuel compressing operation in said high pressure fuel chamber by said plunger is started;

a needle arranged in said housing and opening said nozzle opening to inject the fuel in said high pressure fuel chamber from said nozzle opening when the pressure of fuel in said high pressure fuel chamber is higher than a predetermined pressure;

an actuator having a variable volume chamber filled with fuel;

a spill valve actuated in response to a change in the pressure of fuel in said variable volume chamber to spill out the fuel in said high pressure fuel chamber when the fuel injection is to be stopped;

a fuel source having a pressure which is higher than the atmospheric pressure;

a fuel charging port being in communication with said variable volume chamber and formed on an inner circumferential wall of said plunger bore at a position spaced from said tip face of said plunger on a side opposite to said high pressure fuel chamber, said plunger controlling a fluid communication between said fuel source and said fuel charging port to connect said fuel charge port to said fuel source when said plunger is at the fuel compressing operation start position and to disconnect said fuel charging port from said fuel source while the fuel compressing operation by said plunger is carried out; and

a fuel trapping chamber formed between said plunger and said plunger bore at a position between said fuel supply

port and said fuel charging port to trap fuel which is leaked from said high pressure fuel chamber through a clearance between said plunger and said plunger bore.

4,976,246

FUEL-INJECTION PUMP ARRANGEMENT FOR A TWO-STROKE ENGINE OF A HANDHELD PORTABLE TOOL

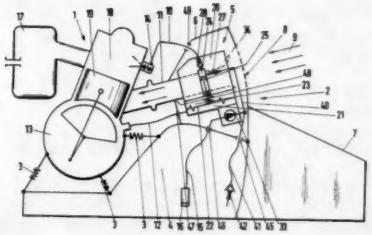
Roland Schierling, Affalterbach; Michael Wiesmann, Schorndorf-Weiler; Hans Nickel, Cottenweiler, and Werner Geyer, Waiblingen, all of Fed. Rep. of Germany, assignors to Andreas Stihl, Waiblingen, Fed. Rep. of Germany

Filed Oct. 21, 1988, Ser. No. 262,146

Claims priority, application Fed. Rep. of Germany, Oct. 22, 1987, 3735711

Int. Cl.[5] F02M *39/00*; **B27B** *17/02*

U.S. Cl. 123—509 **9 Claims**



1. A handheld portable tool comprising:

a handle housing for holding and guiding the tool;

a two-stroke engine having an air intake pipe for conducting combustion air into the engine;

said engine having a cylinder and a piston movable relative to said cylinder; said engine including a crankcase wherein a crankcase pressure is generated in response to the movement of said piston;

vibration damping means interposed between said engine and said housing to reduce the vibrations transmitted from the engine to the housing;

a pneumatically-driven fuel-injection pump for pumping fuel for said engine, said pump being mounted on said housing so as to be separated from said engine by said vibration damping means;

yieldable connection means for interconnecting said pump and said engine; and,

said yieldable connection means including a flexible line for conducting said crankcase pressure to said fuel-injection pump and, a flexible injection line interconnecting said fuel-injection pump and said engine.

4,976,247

IGNITION DEVICE FOR COMBUSTION ENGINES

Helmut Schmied, Marbach, and Bernd Kalkhof, Reutlingen, both of Fed. Rep. of Germany, assignors to Robert Bosch GmbH, Stuttgart, Fed. Rep. of Germany

Continuation of Ser. No. 272,985, Oct. 27, 1988, abandoned. This application May 11, 1990, Ser. No. 522,466

Claims priority, application Fed. Rep. of Germany, Apr. 30, 1986, 3614773

Int. Cl.[5] F02P *9/00, 3/12*

U.S. Cl. 123—651 **20 Claims**

1. Ignition arrangement for combustion engines having

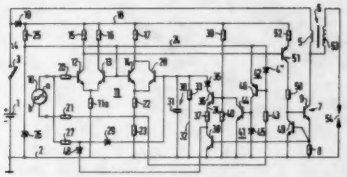
a switching transistor (7) which is current-conductive when a trigger (11–14) is energized,

an igntion coil (6), the primary winding (5) of which forms a series circuit with the switching transistor (7), and

a singal transducer (10) connected in advance of the trigger (11–14), for supplying a control signal which reaches a peak value after expiration of a time interval, wherein

the switching threshold of the trigger can be shifted, relative to the control signal, namely by use of an electrical storage device (31) which can be charged and discharged, and in which the discharge starts in dependence on a predetermined current value in the primary winding (5),

the storage device (31) being chargeable by the control signal of the signal transducer (10) and being dischargeable, selectively, over a first, high-resistance discharge path (32–33) and over a second, switchable low-resistance



discharge path (34–38) and being protected, during discharge, by a blocking element (29) from charging by said transducer control signal;

wherein, when current through said primary winding (5) reaches a predetermined value,

charging of said storage device (31), including any charging originating at said transducer (10), ceases and

said low-resistance discharge path from said storage device is switched (38) closed, thereby discharging said storgae device (31) rapidly and definitively while feedback of current to said storage device from said transducer (10) is blocked (29).

4,976,248

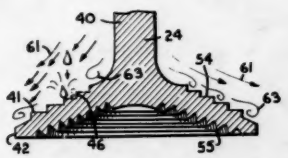
APPARATUS FOR THE GENERATION OF TURBULENCE IN INTERNAL COMBUSTION ENGINES

James Rowe, P.O. Box 22012, Kansas City, Mo. 66127

Filed Apr. 3, 1989, Ser. No. 331,841

Int. Cl.[5] F02B *23/00*

U.S. Cl. 123—659 **6 Claims**

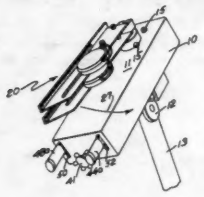


1. An internal combustion engine including a cylinder head, a piston and a cylinder defining a combustion chamber, an intake passage communicating with the chamber, an intake valve for controlling the passage of an air-fuel mixture through said intake passage and into said combustion chamber; the improvement comprising:

(a) textured surface means associated with said combustion chamber for minimizing the energy required to transfer the air-fuel mixture through the engine and for improving the homogeneity of liquid fuel in said air-fuel mixture flow through the intake passage and flowing in the combustion chamber;

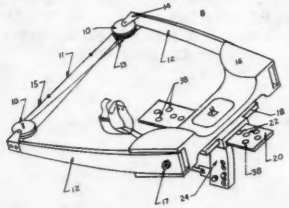
(b) said textured surface means is positioned on the lower surface of the intake valve head.

4,976,249
TARGET LAUNCHING TRAP
Kenneth M. Gagnon, 4 Mill St., Cumberland, R.I. 02864
Filed Jun. 26, 1989, Ser. No. 371,291
Int. Cl.[5] F41B *3/04*
U.S. Cl. 124—8 4 Claims



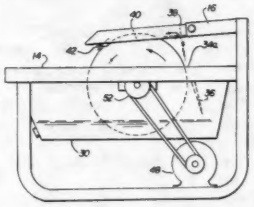
1. A clay pigeon target launching device comprising a housing, an arm, said arm having means to releasably grip a clay pigeon, a pivot shaft supporting said arm, a unidirectional bearing secured to said housing, said shaft supported in said bearing, a crank lever attached to said shaft and having an anchor and a stop abutment, a spring connected to the anchor and to the housing, a pair of rockable levers each pivotally mounted on the housing to rock in and out of engagement with the stop abutment wherein the spring acts upon the crank lever to urge the stop abutment against the levers and both levers must be rocked to release the arm.

4,976,250
ADJUSTABLE COMPOUND BOW
Jennings L. Jeffrey, Coal City, W. Va., assignor to J.L.J. Manufacturing, Inc., Crab Orchard, W. Va.
Filed Dec. 2, 1988, Ser. No. 279,071
Int. Cl.[5] F41B *5/12*
U.S. Cl. 124—25 17 Claims



1. A compound bow comprising:
a. a frame assembly
b. a pair of bow limbs adjustably coupled at a first end thereof to the frame assembly to provide adjustment of a draw weight of the compound bow;
c. a substantially circular eccentric wheel coupled to a second end of each of the bow limbs, each eccentric wheel having a top cable travel groove formed around an outer circumference of the eccentric wheel at a substantially uniform depth and a bottom cable travel groove including a first rounded portion and a let-off channel, wherein the first rounded portion of the bottom cable travel groove is formed around an inner circumference of the eccentric wheel between first and second points, and the let-off channel forms a substantially flat surface that extends from the first point to the second point along a line that is adjacent a pivot point hole formed in the eccentric wheel; and
d. a bow grip assembly coupled to the frame assembly.

4,976,251
TILE SAW APPARATUS AND METHOD
Allen L. Smith, 214 S. 1000 East, Provo, Utah 84601
Filed Jun. 28, 1989, Ser. No. 372,861
Int. Cl.[5] B24B *55/02*; B26D *7/08*; B28D *1/04*
U.S. Cl. 125—13.01 8 Claims



1. A portable table tile saw having a liquid reservoir, comprising:
a saw table connected to and located above said liquid reservoir;
a rotary saw blade protruding through a centralized saw blade slot in said saw table, said rotary saw blade picking up liquid from said liquid reservoir as said rotary saw blade rotates, said picked up liquid being used to cool said rotary saw blade as said rotary blade cuts tile; and
hollow arm means located above said rotary saw blade and connected to said saw table for shielding an operator and for cooperating with said saw table for precisely controlling the amount of liquid utilized by said rotary saw blade;
wherein said saw table and arm means comprise a plurality of liquid controlling measures;
said saw table including a slit means located therein and positioned in line with and directly behind said rotary saw blade such that said slit is an extension of said saw blade slot, said slit being configured to pass only a substantially upwardly directed portion of said picked up liquid through said table said slit means further being approximately as narrow as said rotary saw blade so that a tile may be pushed past said rotary saw blade without affecting said liquid passed upward through said slit means in said saw table;
said hollow arm means including a receiving opening located directly above said slit means for receiving said liquid passed upward through said slit means in said saw table so that liquid received at said receiving opening enters said hollow arm means;
said arm means further comprising a planar bottom portion having a blade slit therein said blade slit originating at said receiving opening which is also located in said planar bottom portion and positioned to envelope a top portion of said rotary saw blade, said planar bottom portion accumulating liquid mist, said liquid mist accumulations and said liquid which has entered said arm means through said arm slit and said receiving opening moving under the force of gravity to a dispensing means also located in said bottom of said arm means, said rotary saw blade rotating through said arm slit and being covered by said arm means so that liquid carried by said rotary saw blade into said arm slit during rotation is contained within said arm means and flows to said dispensing means;
said dispensing means forming a terminus of said blade slit opposite said receiving opening and being configured as a depression having said terminus therein so that liquid in said arm means and liquid mist accumulations on said planar bottom portion of said arm means which have moved to said dispensing means under the force of gravity fall therefrom onto said rotary saw blade approximately where said rotary saw blade cuts a tile;
said saw table further comprising a collection slit proximite

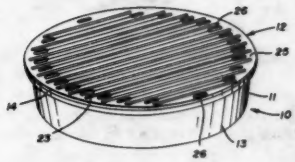
to where said rotary saw blade cuts a tile for returning liquid through said saw table to said liquid reservoir.

4,976,252

STOVE TOP GRILL

Vince Cianciola, 209 Saw Mill Run Rd., Canfield, Ohio 44406

Filed Feb. 15, 1990, Ser. No. 480,245
Int. Cl.[5] F24B 3/00; A47J 37/00
U.S. Cl. 126—27 4 Claims



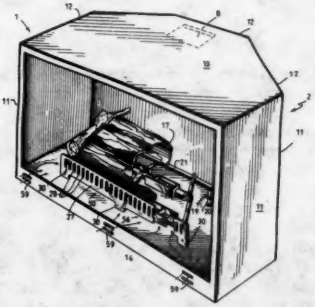
1. A stove top grill apparatus for cooking food on electric or gas stove burners comprising a base portion and a grill portion, said base portion having an annular upstanding wall and an integral apertured conical center wall in spaced relation thereto, a grill portion positioned in spaced relation on said base portion, said grill portion having a plurality of aligned parallel channels, each of said channels defining an upstanding grill rib therebetween, each of said channels are angularly disposed from its longitudinal center to its perimeter edge, slots formed in oppositely disposed relation to one another in each of said channels at their respective perimeter edge, said slots in adjacent channels defining an annular pattern of parallel slots around the perimeter edge of said grill portion, and means for stabilization of said base.

4,976,253

METHOD AND APPARATUS FOR BURNING GAS IN THE COMBUSTION CHAMBER OF A FIREPLACE

Thomas J. Beal, Ossian; Tadeusz Karabin, Huntington, and Roy E. Mundy, Andrews, all of Ind., assignors to Majco Building Specialties, L.P., Huntington, Ind.

Filed Jan. 12, 1990, Ser. No. 464,168
Int. Cl.[5] F24C 3/00
U.S. Cl. 126—512 20 Claims



1. A method of producing an essentially yellow flame pattern amongst an arrangement of non-combustible fireplace logs, with a substantially low level of carbon monoxide production, said method using a gas burner assembly including a pair of spaced apart, elongate horizontal tubular members connected by a transversely extending third tubular member, each of said tubular members including a plurality of openings defining gas jets, and each of said horizontal tubular members including closed ends, said burner assembly being disposed within a combustion chamber of a fireplace enclosure provided with an exhaust and containing combustion chamber air which is continuously provided thereto from the outside of said combustion chamber, one of said pair of horizontal tubular members being positioned rearwardly of the other said horizontal tubular members, said method comprising:

(a) arranging said non-combustible fireplace logs above and adjacent to said gas burner assembly so as to provide one of more flow paths between said horizontal tubular members and adjacent logs, for the free flow of combustion chamber air through said flow paths and about said horizontal tubular members;

(b) providing a flow of gas through said tubular members so that said gas flows out of the gas jets and mixes with said combustion chamber air about said jets of said tubular members;

(c) igniting said mixture of gas combustion chamber air to thereby combust said mixture, producing a substantially uniform flame pattern along the lengths of said horizontal tubular members and producing combustion gases from said combusted mixture;

(d) concentrating combustion chamber air flowing through said flow paths and about said horizontal tubular members so that said flame patterns have an essentially yellow color; and

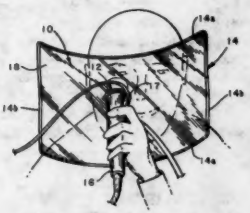
(e) maintaining said logs above said tubular members at a sufficient temperature so that said combustion gases within said flame patterns react in said flame patterns in proximity with said logs, whereby said combustion gases flowing out of said exhaust have substantially low levels of carbon monoxide.

4,976,254

ENDOSCOPY SHIELD

Georgia P. Dash, 7805 Lafayette Ave., Melrose Park, Pa. 19126, and Dorothy L. Borton, 503 Rodman Ave., Jenkintown, Pa. 19046

Continuation-in-part of Ser. No. 145,531, Jan. 19, 1988, Pat. No. 4,848,322. This application Apr. 19, 1989, Ser. No. 340,425
The portion of the term of this patent subsequent to Jul. 18, 2006, has been disclaimed.
Int. Cl.[5] A61B 1/00
U.S. Cl. 128—4 6 Claims



1. A shield for use with an endoscope or the like having a tubular eyepiece for protecting a user from splashback, comprising:

a clear sheet having a vertical dimension sufficient to extend substantially along the entire length of the face of the user and having a horizontal dimension equal to said vertical dimension and sufficient to extend to cover at least the lateral aspects of the face of the user;

malleable material extending across said sheet and having a horizontal extent for maintaining said sheet in an adjusted concave shape which wraps around the face of the user to

shield the front and lateral aspects of the face of the user; and

means for sealingly mounting and retaining said sheet on said tubular eyepiece.

4,976,255

APPARATUS FOR EXTRACORPOREAL LITHOTRIPSY USING SHOCK WAVES AND THERAPEUTIC ULTRASOUND

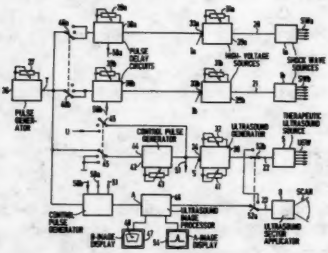
Helmut Reichenberger, Eckental; Georg Naser, Zirndorf, and Erhard Schmidt, Erlangen, all of Fed. Rep. of Germany, assignors to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Aug. 15, 1989, Ser. No. 393,789

Claims priority, application European Pat. Off., Aug. 17, 1988, 88113376

Int. Cl.[5] A61B *17/22*

U.S. Cl. 128—24 A **23 Claims**



1. An extracorporeal lithotripsy apparatus comprising:

means for generating shock waves focused in a first focus zone lying on an acoustic axis of said means for generating shock waves;

means for generating therapeutic ultrasound waves converging in a second focus zone lying on an acoustic axis of said means for generating therapeutic ultrasound waves;

means for mounting said means for generating focused shock waves and said means for generating therapeutic ultrasound waves;

said means for generating focused shock waves and said means for generating therapeutic ultrasound waves being disposed in said means for mounting so that their respective acoustic axes intersect and said first and second focus zones substantially coincide;

means for coupling said focused shock waves and said therapeutic ultrasound waves into a body of a patient in which a calculus to be disintegrated is disposed; and

means for driving said means for generating focused shock waves and said means for generating therapeutic ultrasound waves in a selected chronological sequence.

4,976,256

BODY MASSAGE APPARATUS

Dave B. Marlin, and Earl B. Marlin, Jr., both of 2688 Lane St., I-85, Exit 63, Kannapolis, N.C. 28081

Filed Jun. 20, 1989, Ser. No. 369,320

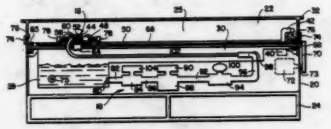
Int. Cl.[5] A61H *23/00*; A47C *31/00*

U.S. Cl. 128—64 **19 Claims**

1. Apparatus for body massage comprising:

a bed structure having a housing defining an interior massage chamber and an upwardly-facing opening communicating with said massage chamber, and a resiliently flexible membrane affixed to said housing in substantially sealing relation generally horizontally across said opening, said membrane being in sufficiently tensioned condition for forming a primary weight-bearing body support surface on which a user may lay for massage treatment while retaining sufficient resiliency and flexibility in its tensioned condition to generally conform to a user's body, said chamber being substantially filled with air;

fluid jet means disposed within said chamber for directing a fluid jet emission at said membrane; and



means for supplying a quantity of massage fluid under pressure to said fluid jet means for emission thereby with sufficient force to transmit a massaging effect through said membrane to the body of a user laying thereon.

4,976,257

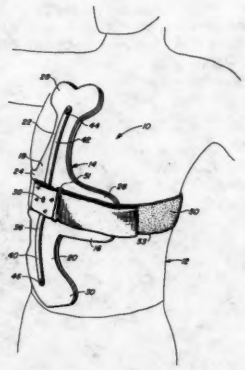
HYPEREXTENSION BRACE

Timothy W. Akin, 1620 Clinton Ave., Alameda, Calif. 94501, and Rudi Bindi, Belle Air Beach, Fla., assignors to Timothy W. Akin

Filed Aug. 15, 1989, Ser. No. 393,782

Int. Cl.[5] A61F *5/02*

U.S. Cl. 128—78 **12 Claims**



1. A hyperextension brace for use on a human body, said brace comprising, in combination:

anterior brace means including an anterior brace portion of unitary construction and formed of flexible sheet material, said anterior brace portion having a central segment, a first pair of opposed arms projecting from said central segment along a first axis and a second pair of opposed arms projecting from said central segment along a second axis substantially perpendicular to said first axis, one of said first pair of opposed arms enlarged at the distal end thereof to form a sternal pad element and the other of said first pair of opposed arms enlarged at the distal end thereof to form a pubic pad element, an elongated, rigid reinforcement member disposed along said first axis extending across said central segment and terminating at opposed reinforcement member ends located at said sternal pad element and said pubic pad element, and attachment means for fixedly attaching said reinforcement member to said anterior brace portion at said central segment and at each of the arms of said first pair of opposed arms whereby said sternal pad element, said pubic pad element

and said central segment are maintained in substantially fixed relationship relative to one another;

securement means for securing said brace to a human body and including a strap connected to said anterior brace portion central segment and extendable along said second axis over said second pair of opposed arms, said strap when tightened about said human body adapted to bend the arms of said second pair of opposed arms into general conformance with said human body; and

back brace means attached to said strap for retention by said strap on said human body.

4,976,258

LOCKING NAIL

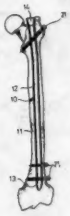
Karl M. Richter, Wendtorf, Fed. Rep. of Germany, and Vilmos Vecsei, Vienna, Austria, assignors to Howmedica International, Inc., Kiel, Fed. Rep. of Germany

Continuation of Ser. No. 14,567, Feb. 13, 1987, abandoned, which is a continuation of Ser. No. 585,313, Mar. 1, 1984, abandoned. This application May 5, 1988, Ser. No. 191,745

Claims priority, application Fed. Rep. of Germany, Sep. 9, 1983, 8306675

Int. Cl.[5] A61F *5/04*

U.S. Cl. 606—64 6 Claims



1. A bone nail for the treatment of bone fractures comprising an elongated hollow body tapered at the front end and having an enlargement at the rear end by which it is driven into a bone of a patient for the accommodation of a driving tool and at least one pair of transverse bores for the accommodation of bone screws, one of said bores being adjacent the front end of said body and one of said bores being adjacent the rear end of said body, with the cross-sectional profile of said body being closed over the circumference of said profile in the shape of a ring, and with the radius of the outer surface of said body changing over said circumference in such a manner that a steadily rounded contour results and said outer surface is provided with alternating elevations and depressions over the circumference thereof.

4,976,259

ULTRASONIC NEBULIZER

James R. Higson, Santa Barbara; David A. D'Alfonso, Goleta, and Robert R. Walls, Santa Barbara, all of Calif., assignors to Mountain Medical Equipment, Inc., Denver, Colo.

Continuation-in-part of Ser. No. 944,203, Dec. 22, 1986, abandoned. This application Nov. 2, 1988, Ser. No. 266,823

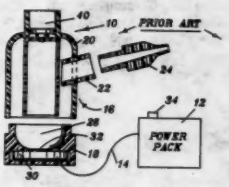
Int. Cl.[5] A61M *11/00*

U.S. Cl. 128—200.18 10 Claims

1. In an apparatus for the nebulization of fluids in which a piezoelectric transducer is disposed in communication with a fluid reservoir for nebulizing liquid medication in the fluid reservoir, the improvement comprising:

a protective cover member of a predetermined wavelength superimposed on said piezoelectric transducer, adjacent said reservoir said cover member and transducer having generally planar confronting surfaces and a common interface therebetween;

annular sealing means in outer surrounding relation to said cover member for preventing the loss of fluid from said interface; and



oil coupling means in said interface for coupling the energy from said transducer to said cover member.

4,976,260

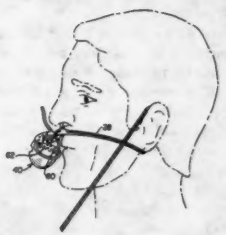
APPARATUS AND METHOD FOR RESPIRED GAS COLLECTION AND ANALYSIS

Steven J. Derrick, 1077 Huston Dr., West Mifflin, Pa. 15122

Filed Mar. 27, 1990, Ser. No. 499,977

Int. Cl.[5] A61M *15/08*

U.S. Cl. 128—200.24 17 Claims



1. Apparatus for collecting, transporting, sampling and analyzing gases respired by a patient, said apparatus comprising:

cannula means constructed and arranged for placement in at least one of the patient's nares,

said cannula means having at least one opening distal from the patient's nare for conducting respired nasal gases, and

a nasal respired gas conduit having at least two spaced openings, with one of said openings connected in fluid communication with the respired gas opening of the cannula means and the other end of said nasal respired gas conduit connected to nasal respired gas collection means, and

oral respired gas capture means suspended from said nasal respired gas collection means near the patient's mouth, and

said oral respired gas capture means having a hollow member having at least one aperture therein, constructed and arranged to permit aggregation of oral respired gases therein and having at least one effluent opening for the removal of oral respired gases therefrom, and

an oral respired gas conduit having at least two spaced openings therein, with one of said openings connected in fluid communication with the effluent port of said oral respired gas capture means and the other end of said oral respired gas conduit connected to collecting means for said oral respired gas.

4,976,261

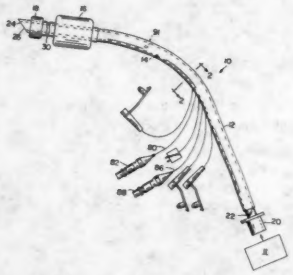
ENDOTRACHEAL TUBE WITH INFLATABLE CUFFS

Eric H. Gluck, West Hartford; Brian E. Thompson, Colchester, and Michael A. Hall, Glastonbury, all of Conn., assignors to Advanced Pulmonary Technologies, Inc., Glastonbury, Conn.

Filed Apr. 3, 1989, Ser. No. 331,815

Int. Cl.[5] A61M *16/00*

U.S. Cl. 128—207.15 **15 Claims**



1. An endotracheal tube adapted for insertion through the mouth of a patient and into the patient's trachea comprising:

elongated tube means having a proximal end and a distal end portion which terminates in a tip, said tube means defining a central ventilation passage;

first inflatable means encircling said tube means between said proximal end and tip for generally centrally locating and sealing the tube means in the trachea upon the inflating thereof;

non-occlusive second inflatable means spaced from said first inflatable means and encircling said tube means at said distal end portion in close proximity to said tip for preventing contact between said tube means tip and the trachea upon the inflating of said second inflatable means, said second inflatable means having an inflated diameter which is less than the inflated diameter of said first inflatable means;

first inflating means for selectively inflating and deflating said first inflatable means; and

second inflating means for selectively inflating and deflating said second inflatable means whereby upon the positioning of said tube means in the trachea of a patient and inflating of said first and second inflatable means the central axis of the patient's trachea is generally approximately coaxial with the axis of said tube means at said distal end portion.

4,976,262

ICE BAG HOLDING DEVICE

Jed Palmacci, 9005 South 3605 East, Sandy, Utah 84093

Filed Jan. 27, 1989, Ser. No. 303,439

Int. Cl.[5] A61F *7/08, 7/10*

U.S. Cl. 128—402 **7 Claims**

1. An ice bag holding device for an injured joint comprising:

two way flexible wrap means comprising first flexible wall means to be contiguously wrapped in one direction upon an injured joint, second flexible wall means to be contiguously wrapped upon the injured joint in another direction and means by which the first and second wall means are releasibly secured together in their respective wrapped positions;

yieldable protruding ice bag restraining means permanently carried by at least one of the wall means, the restraining means comprising flexible exterior layer means defining exposed frontal aperture means through which a spout of an ice bag may be caused to protrude and flexible interior layer means juxtaposed the exterior layer means, the interior layer means comprising interior aperture means greater in size than the exposed aperture means through

which contiguous contact by the ice bag with the injured joint is achieved.

4,976,263

EQUIPMENT FOR THE TREATMENT OF LYMPH BLOCKAGES AND THE LIKE

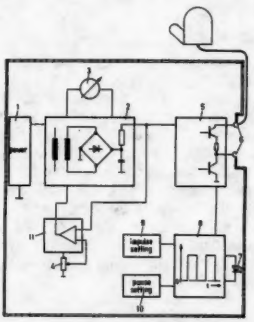
Hans Seidl; Wolfgang Walder, both of Amberg, and Walter Reinhold, Schnaittach b. Nbg., all of Fed. Rep. of Germany, assignors to Physiomed-Medizintechnik GmbH, Fed. Rep. of Germany

Filed Apr. 6, 1988, Ser. No. 178,147

Claims priority, application Fed. Rep. of Germany, May 20, 1987, 3716816

Int. Cl.[5] A61N *1/40, 1/04*

U.S. Cl. 128—421 **9 Claims**



1. Equipment for the treatment of lymph blockages, hyperacidic musculature and the like comprising

switching circuit means for generating a series of high voltage impulses with a variable frequency, the basic frequency being about 30 Hz;

two contact means for applying said voltage impulse to a part of the body being treated; wherein one of the contact means has a contact surface formed by a vinyl layer with very good insulating properties;

said switching circuit means further comprising a quick discharge and current limiting circuit formed by a switching transistor;

and wherein said first of said two contact means is shaped as a glove;

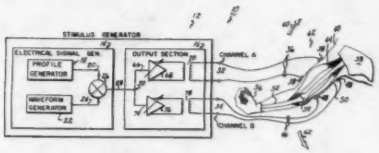
the internal side of said glove being provided with an electrode, said electrode being connected with said switching circuit means.

4,976,264

POWER MUSCLE STIMULATOR

Steven H. Petrofsky, Dayton, Ohio, assignor to Therapeutic Technologies Inc., Tampa, Fla.

Filed May 10, 1989, Ser. No. 349,856
Int. Cl.[5] A61N 1/00
U.S. Cl. 128—421 34 Claims



1. A method of isometrically stimulating muscles associated with a limb adapted to rotate at a joint, comprising:

substantially simultaneously:

(1) applying a first electrical stimulus to an agonist muscle associated with the limb to contract the agonist muscle whereby to tend to rotate the limb in one direction; and

(2) applying a second electrical stimulus to an antagonist muscle associated with the limb to contract the antagonist muscle whereby to tend to rotate the limb in another, opposite direction;

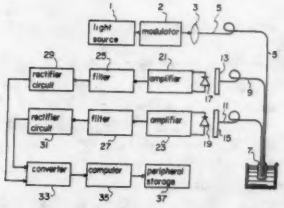
wherein the first and second electrical stimuli being effective to cause contraction of the respective muscles in an amount such that tendency of the limb to rotate in one direction is offset by a substantially equal tendency to rotate in the opposite direction whereby to isometrically stimulate the muscles substantially without creation of a net torque at the joint.

4,976,265

METHOD OF DETECTING ENTEROGASTRIC REFLUX

Riccardo Falcial; Annamaria V. Scheggi; Francesco Baldini, and Paolo Bechi, all of Florence, Italy, assignors to Consiglio Nazionale delle Richerche, Rome, Italy

Filed Dec. 20, 1988, Ser. No. 287,480
Claims priority, application Italy, Dec. 23, 1987, 9584 A/87
Int. Cl.[5] A61N 5/06
U.S. Cl. 128—634 7 Claims



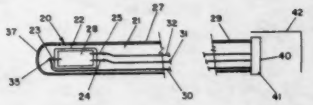
1. A method of detecting enterogastric reflux, comprising the steps of measuring the absorption of electromagnetic radiation by gastric juice of a patient at at least two wavelengths, one of said wavelengths corresponding to an absorption peak of a bile component and another of said wavelengths having a value at which absorption is unaffected by a concentration of said bile determining whether or not there is endogastric reflux based on the measurement of the absorption of the electromagnetic radiation at said wavelengths.

4,976,266

METHODS OF IN VIVO RADIATION MEASUREMENT

Dennis D. Huffman; Robert C. Hughes; Charles A. Kelsey, all of Albuquerque, N. Mex.; Richard Lane, Galveston, Tex.; Antonio J. Ricco, Albuquerque, N. Mex.; Jay B. Snelling, Albuquerque, N. Mex., and Thomas E. Zipperian, Albuquerque, N. Mex., assignors to United States Department of Energy, Washington, D.C.

Division of Ser. No. 901,867, Aug. 29, 1986, abandoned. This application Jul. 25, 1988, Ser. No. 224,282
Int. Cl.[5] G01T 1/161
U.S. Cl. 128—659 5 Claims



1. The method for in vivo monitoring of radiation applied to a patient, the method comprising the steps of:

placing a radiation source at a fixed location inside the patient's body;

inserting a radiation sensitive MOSFET inside the patient's body in close proximity to said radiation source, said MOSFET having a threshold voltage that changes in accordance with the cumulative radiation dosage;

removing said MOSFET from the body after a period of radiation; and

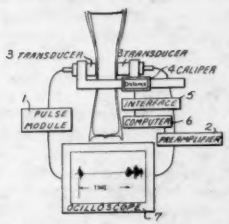
measuring the change in threshold voltage caused by the radiation from said source after said MOSFET has been removed from the body.

4,976,267

METHOD AND APPARATUS FOR THE MEASUREMENT OF BONE QUALITY IN VIVO

Leo B. Jeffcott, Werribee, and Ronald N. McCartney, Dural, both of Australia, assignors to The University of Melbourne, Parkville, Australia

Filed Jul. 18, 1988, Ser. No. 220,083
Claims priority, application Australia, Jul. 16, 1987, PI3216
Int. Cl.[5] A61B 10/00
U.S. Cl. 128—660.01 6 Claims



6. An apparatus for determining in vivo an estimate of the modulus of elasticity of a bone comprising transducer means for transmitting and receiving an ultrasound beam through the bone along a first path through the cortex of said bone and along a second path through the cortex and medulla of said bone, means for measuring the distance between said transducers and for subtracting from that distance an estimate of the thickness of an overlying tissue to obtain a measure of the diameter of said bone, means for determining the time of transmission of said ultrasound beam along said first and second paths, means for calculating the velocity of said beam along said first and second paths and for calculating an estimate of the transverse cortical bone velocity and the ratio of the diam-

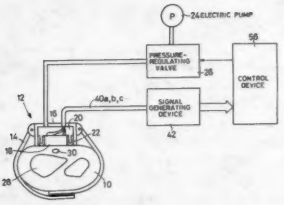
eter of the medulla to the diameter of the cortex, and means for calculating an estimate of the cross-sectional area of the cortex and for calculating from this information and from a separately derived measurement of the mineral content of said bone an estimate of the modulus of elasticity of the bone.

4,976,268

PRESSURE-PULSE-WAVE DETECTING APPARATUS

Kimimasa Kurosawa, Komaki; Chikao Harada, Nagoya; Hiroshi Sakai, Kasugai, and Minoru Niwa, Nagoya, all of Japan, assignors to Colin Electronics Co., Ltd., Japan

Filed Jun. 21, 1989, Ser. No. 369,684
Claims priority, application Japan, Jun. 24, 1988, 63-157735
Int. Cl.[5] A61B *5/02*
U.S. Cl. 128—687 **10 Claims**



1. A pressure-pulse-wave detecting apparatus for detecting a pressure pulse wave produced from an arterial vessel of a subject, at a plurality of positions on a body surface right above said arterial vessel, the apparatus comprising:

a main body having a pressing surface which is pressed against said body surface, and a plurality of through holes formed therethrough and opening in said pressing surface;

a plate member secured to said pressing surface of said main body such that said plate member covers the openings of said plurality of through holes, said plate member having flexibility and including a plurality of displaceable portions each of which is aligned with the opening of a corresponding one of said plurality of through holes;

a plurality of optical fibers, one of opposite ends of each of said plurality of optical fibers being fitted in a corresponding one of said plurality of through holes of said main body, such that an end face of said one of opposite ends is opposed to a corresponding one of said plurality of displaceable portions of said plate member at a predetermined distance therefrom; and

a plurality of signal generating devices each of which is connected to the other of the opposite ends of a corresponding one of said plurality of optical fibers, said each signal generating device detecting the pressure pulse wave transmitted to a corresponding one of said plurality of displaceable portions of said plate member, based on minute displacement of said corresponding displaceable portion which is optically detected through said corresponding optical fiber, and generating an electrical signal representing the detected pressure pulse wave.

4,976,269

TISSUE NEEDLE

Donald N. Mehl, Chanhassen, Minn., assignor to Creative Research & Manufacturing, Minneapolis, Minn.

Filed Oct. 26, 1989, Ser. No. 426,767
Int. Cl.[5] A61B *10/00*
U.S. Cl. 128—754 **4 Claims**

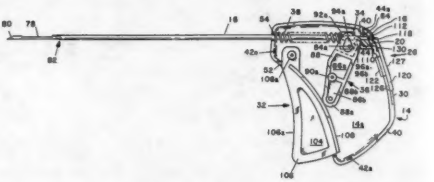
1. Apparatus for obtaining a tissue sample comprising:

a. a housing having a front face and an opposite rear face;

b. a cannula having a proximal end and a distal end wherein said proximal end is slidably affixed to said housing and protruding from said front face of said housing and said distal end is sharpened to puncture tissue;

c. a stylet slidably located within said cannula having a distal end with means for holding said tissue sample and proximal end removably attached to said housing and removable from said rear face of said housing;

d. means on said front face responsively coupled to said cannula and responsive to a control force in a first direction for advancing said cannula and for returning said cannula to a retracted position in response to removal of said control force in said first direction; and,



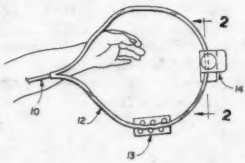
e. means slidably located on said rear face of said housing for locking said stylet to prevent movement with respect to said housing when in a first position and for releasing said stylet to permit removal from said housing when in a second position.

4,976,270

APPARATUS FOR CONTINUOUSLY SAMPLING PLASMA

Fritz F. Parl, Nashville, Tenn.; Charles A. Bradley, Lubbock, Tex.; Herman Benge, Brentwood, and David L. Black, Hendersonville, both of Tenn., assignors to Vanderbilt University, Nashville, Tenn.

Filed Mar. 28, 1989, Ser. No. 329,801
Int. Cl.[5] A61B *5/00*
U.S. Cl. 128—760 **4 Claims**



1. An apparatus for continuously sampling plasma in a closed system for a patient comprising:

means for removing a continuous flow of blood from a patient at a site on the patient and for returning removed blood to the patient at said site;

means for creating a blood flow path including pumping means and tubing means, said tubing means communicating between said means for removing and returning blood, and said pumping means; and

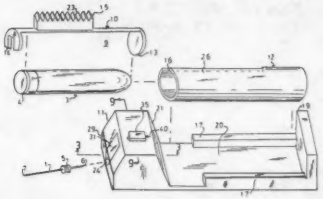
means for separating the plasma component from the removed blood in said blood flow path;

said removal and return means comprising a cannula body formed of flexible material having proximal and distal ends; said body having on outflow lumen and inflow lumen extending from said proximal end to said distal end; said body also having a rigid, one-piece removable core extending the length of and within both lumina from the proximal to distal ends and being looped at the proximal end, said core being utilized to insert said apparatus into a blood vessel.

4,976,271
BLOOD DRAWING SYSTEM

Paul A. Blair, 3621 NW. 23rd St., Lauderdale Lakes, Fla. 33311

Continuation-in-part of Ser. No. 193,059, May 12, 1988. This application May 8, 1989, Ser. No. 348,657
Int. Cl.[5] A61B *5/00*
U.S. Cl. 128—764 10 Claims



1. A system for safely withdrawing blood samples with an evacuated tube sealed by a pierceable rubber stopper and a double-ended needle having a middle portion, the improvement comprising:

(a) a holder means for removably holding said needle and a cartridge means in position for withdrawing blood;

(b) tube sliding means for sliding said tube onto said needle through said stopper in a first sliding motion and for sliding said tube away from said needle in a second sliding motion, said sliding means slidable relative to said holder means and said cartridge means;

(c) cartridge means for removably enclosing said tube and said sliding means therein in position for providing said first and said second motion by finger control of said sliding means when said holder is holding said cartridge means; and

(d) needle engaging means connected to said holder means for securely engaging said needle in position for phlebotomy in cooperation with said tube and needle releasing means for releasing said needle after use, wherein said needle releasing means is operable from behind the exposed point of said needle to prevent accidental contact with said point after it is contaminated with blood.

4,976,272
METHOD AND DEVICE FOR MEASURING THE ELASTICITY OF A SUPERFICIAL LAYER, IN PARTICULAR OF THE SKIN

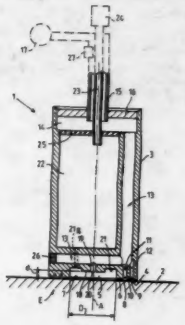
Roland M. Bazin, Vitry S/Seine; Gérard Obadia, Montrouge; Louis Marcotte, Chevilly La Rue - Rungis, and Jean Scot, Paris, all of France, assignors to L'Oreal, Paris, France

Filed Mar. 31, 1989, Ser. No. 331,398
Claims priority, application France, Mar. 31, 1988, 88 04292
Int. Cl.[5] A61B *5/10*
U.S. Cl. 128—774 8 Claims

1. In a method of measuring the elasticity of a superficial layer, in particular of the skin, with the use of a sensor apparatus of the type having a face member for engaging the layer, said face member including an opening to a cavity with the opening lying in a plane, the cavity having a projection surface spaced a first distance from the plane and a recess spaced a second distance from the plane with the first distance being less than the second distance, the projection surface including passage means for connection to a source of negative pressure and the recess having passage means for connection to pressure indicating means, the steps comprising

(a) applying the opening of the sensor apparatus to a zone of the superficial layer;

(b) applying a negative pressure to the cavity through the passage means of the projection surface to cause a deformation of the zone of the layer sufficient to move the layer in the zone through the first distance to close the passage means of the projection surface; and

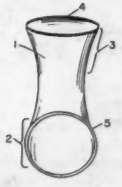


(c) measuring the amplitude of the negative pressure causing the deformation by the pressure indicating means through the passage means of the recess.

4,976,273
TUBULAR PROTECTIVE DEVICE FOR PROTECTION AGAINST TRANSFER OF INFECTIOUS MATTER DURING SEXUAL INTERCOURSE

Lasse Hessel, Goring-On-Thames, England, assignor to Chartex International plc, London, England

Continuation of Ser. No. 58,766, Jun. 15, 1987, Pat. No. 4,735,621. This application Jan. 27, 1988, Ser. No. 148,992
Claims priority, application Denmark, Mar. 2, 1987, 1075/87
The portion of the term of this patent subsequent to Apr. 5, 2005, has been disclaimed.
Int. Cl.[5] A61F *13/00*
U.S. Cl. 128—844 4 Claims



1. A tubular protective device for protection against a transfer of infectious matter during sexual intercourse consisting of:

(a) a flexible, thin-walled tube having a sufficiently large first diameter to permit movement of a penis within said tube during coitus, said tube having a closed end and an open end, said open end having;

(i) a collar-shaped, outwardly extending conical portion, and

(ii) an elastic ring integrally connected with said collar-shaped portion having a second diameter larger than said first diameter; wherein said flexible, thin-walled tube is a polymer material, said polymer material being selected from the group consisting of polyethylenes, polyurethanes, and derivatives thereof; and

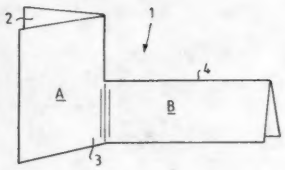
(b) a means for retaining located in said closed end of said flexible, thin-walled tube and having a diameter sufficient to maintain said means for retaining in a vagina of an user.

4,976,274

SURGICAL DRAPE AND A METHOD FOR ITS MANUFACTURE

Carl-Otto Hanssen, Kullavik, Sweden, assignor to Molnlycke AB, Goteborg, Sweden

Filed May 11, 1988, Ser. No. 195,681
Claims priority, application Sweden, May 15, 1987, 87020095
Int. Cl.[5] A61B *19/00, 19/08*
U.S. Cl. 128—849 **10 Claims**



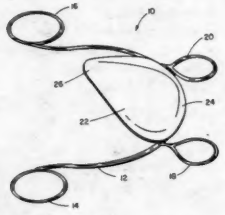
1. A surgical drape comprising two identically shaped sheet parts each having substantially the form of an L, said sheet parts each having two limbs extending perpendicularly relative to each other, said limbs having inner edges, the inner edges of said limbs of one said sheet part being joined to the inner edges of said limbs of the other said sheet part.

4,976,275

METHOD OF BREAKING A NAIL BITING HABIT

Kathy M. Dixon, 308 N. Clayton, Wynnewood, Okla. 73098

Filed Jun. 14, 1989, Ser. No. 365,724
Int. Cl.[5] A61C *5/14;* A61F *5/37*
U.S. Cl. 128—860 **1 Claim**



1. A method of breaking a severe adult nail biting habit comprising:

(A) placing a tongue shield assembly in a patient's mouth on the patient's lower jaw, the patient's mouth including a frontal portion, a rear portion, incisor and bicuspid teeth located in the frontal portion and molars located in the rear portion, with the patient's throat being located adjacent to the rear portion of the mouth;

(B) positioning the tongue shield in the frontal portion of the patient's mouth and covering the frontal portion of the patient's mouth from the incisor teeth therein to the bicuspid teeth therein;

(C) orienting the tongue shield to extend essentially parallel to a plane containing the cutting edges of said bicuspid and incisor teeth with a front portion of said tongue shield located adjacent to the frontal portion of the patient's mouth and a rear portion thereof located adjacent to the rear portion of the patient's mouth;

(D) permitting free movement of the patient's tongue behind the rear portion of the tongue shield and free movement of items, such as food, into the patient's mouth; and

(E) preventing movement of the patient's tongue into the frontal area of the patient's mouth by means of said tongue shield so a tip of that tongue cannot contact a nail or a fingertip that has been inserted into the patient's mouth for the purpose of nail biting; and

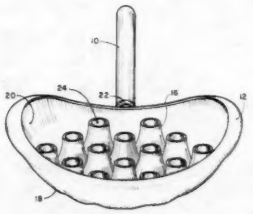
(F) gluing the tongue shield to the patient's molars.

4,976,276

PORTABLE HAIR STYLER

Allison Avery, 2902 Glen Canyon Rd., Santa Cruz, Calif. 95060

Filed Jan. 30, 1990, Ser. No. 472,076
Int. Cl.[5] A45D *7/02*
U.S. Cl. 132—212 **9 Claims**



1. A portable hair styler adapted to be applied against a selected portion of a human head to hold and position the hair in place during a drying application, comprising:

an elongated handle,

a substantially circular frame member attached to said handle, and

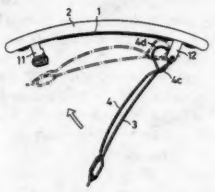
a styling bowl having an opening to the interior thereof and being adapted to permit the insertion of at least a portion of a person's head in the interior thereof and being composed of a lightweight material having a plurality of conical projections with apertures therethrough, said styling bowl being molded and shaped for cooperative association with said circular frame, whereby said plurality of conical projections focus heated air from a hair dryer to form, separate, and style the hair into waves and curls.

4,976,277

HAIR CLIP

Masahiro Yasuda, 22-6, Dairenminami 1-chome, Higashi Osaka-shi, Osaka, Japan

Filed Dec. 27, 1988, Ser. No. 290,698
Claims priority, application Japan, Feb. 4, 1988, 63-14284[U]
Int. Cl.[5] A45D *8/28*
U.S. Cl. 132—279 **4 Claims**



1. A hair clip comprising;

a base plate including a main body portion and a pair of brackets provided at a first end;

a retainer including first and second ends, the first end being pivotally secured to the brackets of the base plate at the first end of the base plate; and

a spring board disposed between the base plate and the

retainer, said spring board including first and second ends, the first end being slidably mounted to the first end of the retainer, the second end being secured to the second end of the retainer, said spring board including a pair of abutments at the first end for engaging the base plate to flex the spring board outwardly of the retainer as the second ends of the retainer and spring board move toward the base plate.

4,976,278

METHOD AND APPARATUS FOR INTRODUCING AND POSITIONING A TANK CONTENTS REMOVAL MEANS

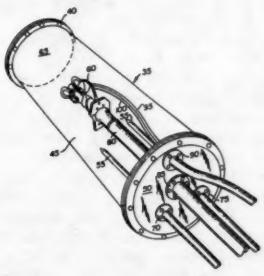
Ian Ripley, and Anthony H. Needham, both of Cleveland, United Kingdom, assignors to Great Eastern (Bermuda) Ltd., New York, N.Y.

Filed Jan. 16, 1990, Ser. No. 464,867

Claims priority, application United Kingdom, Feb. 1, 1989, 8902171

Int. Cl.[5] F04B *23/00*

U.S. Cl. 137—15 23 Claims



1. A method for introducing and positioning a removal means into the interior of an enclosure containing flowable material for the removal of at least a portion of the flowable material, characterized that the enclosure has a passageway with one end of the passageway communicating with the interior of the enclosure and its other end communicating with the exterior of the enclosure, said removal means being positioned within the passageway and said other end of the passageway terminating with one or more opening means which allow access from the exterior of the enclosure to the interior of the passageway, and employing the steps of:

(a) moving the removal means towards the one end of the passageway communicating with the interior of the enclosure and introducing the removal means into the interior of the enclosure while being supported by a telescoping means which is coupled to the removal means and which is pivotally mounted at the other end of the passageway which communicates with the exterior of the enclosure;

(b) positioning the removal means in the interior of the enclosure in a horizontal plane and in a direction along the longitudinal axis of the passageway by extending or retracting the telescoping means; and

(c) positioning the removal means in the interior of the enclosure in a vertical plane which is substantially perpendicular to the said horizontal plane wherein, as a result of such vertical positioning, the telescoping means is pivoted about its pivotal mount.

4,976,279

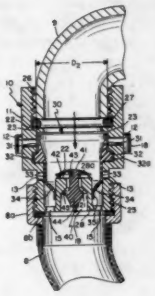
SELF-DRAINING BACKFLOW PREVENTION VALVE

Lloyd H. King, Sr., 5222 Green Farms Rd., Edina, Minn. 55436, and Joseph A. King, 16261 S. Temple Dr., Minnetonka, Minn. 55343

Filed Nov. 20, 1989, Ser. No. 438,807

Int. Cl.[5] E03C *1/10*

U.S. Cl. 137—107 13 Claims



1. A device for preventing backflow of a liquid comprising:

a housing for attachment to a faucet to permit entry of a liquid under pressure into said housing, said housing including a liquid passage to permit flow of liquid therethrough, said housing including a drain passage to permit backflow liquid to drain from said housing, said housing including an air inlet passage to permit air to enter said housing so that liquid can be drained from a faucet attached to said device; and

a resilient sleeve, said resilient sleeve having a first region for covering said air inlet passage to prevent liquid from flowing through said air inlet passage when liquid under pressure is supplied to said housing, said resilient sleeve having a second region for covering said drain passage to prevent liquid from flowing through said drain passage when liquid under pressure is supplied to said housing, said resilient sleeve having a third region that is expandable to permit liquid to flow through said sleeve when liquid under pressure is supplied to said housing, said third region contractible when the liquid under pressure loses pressure to permit said third region to contract and prevent backflow of liquid through said sleeve by directing liquid through said drain passage.

4,976,280

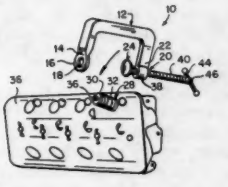
VALVE SPRING COMPRESSION TOOL

Robert Lagana, 197 Main St., Eastchester, N.Y. 10707

Filed Jan. 31, 1990, Ser. No. 472,965

Int. Cl.[5] F16K *43/00*; B23P *19/04*

U.S. Cl. 137—315 4 Claims



1. A valve spring compression tool comprising:

(a) a C-shaped frame having at a first extremity, a fixed,

circular pad with a central aperture therethrough defining a ring-form surface for bearing against a valve washer;

(b) a movable pad having a circular surface that bears against the valve head; and,

(c) means at a second extremity of said C-shaped frame, for moving said movable pad toward and away from said fixed pad in an axial alignment so that when a valve head of a valve bears against said movable pad and a valve washer bears against said fixed pad a valve spring can be compressed to release a pair of retaining members from a valve stem through said central aperture so that the valve can then be disassembled from an engine block, the ring-form bearing surface of the fixed pad and the circular bearing surface of the movable pad each having an encircling chamfer so that the tool can be precisely aligned with valves of different sizes concentrically with the fixed and movable pads when compressing the valve spring.

4,976,281

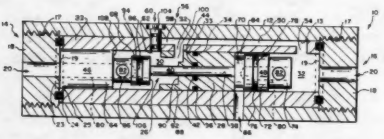
SAFETY VALVE ASSEMBLY FOR FLUID SYSTEM

Wilhelm A. Berglund, 6834 W. Ardmore, Chicago, Ill. 60631

Filed May 10, 1990, Ser. No. 521,394

Int. Cl.[5] F16K *17/32*

U.S. Cl. 137—460 **18 Claims**



1. A safety valve assembly for use in a closed fluid system to seal off a portion of the system downstream of the assembly when the downstream portion develops a leak therein, said assembly comprising:

a hollow cylinder forming a body having an inlet end and a outlet end;

a hollow cylindrical sleeve fitting within and extending along the interior of the cylinder, said sleeve including an external axial passageway;

end caps closing the ends of said cylinder and having axial throughbores therein;

a plug member within said cylindrical sleeve dividing the interior space within said cylindrical sleeve into an

an inlet end chamber and an outlet end chamber;

inlet means communicating with said inlet chamber, and one end of said external passageway of said sleeve;

outlet means communicating with said outlet chamber, and another end of said external passageway of said sleeve;

reciprocating pistons freely slidable within said inlet chamber and within said outlet chamber;

said piston means being maintained in relative position by a pilot pin slidably retained within axial passage means within said plug member between said pistons;

passage means extending through said pistons permitting controlled fluid flow therethrough to and between said inlet and said outlet chambers via said external passageway in said sleeve;

said pistons being slidable within said chambers to control access to said external passageway in said sleeve;

said external passageway being maintained open in response to an equalized pressure within the assembly and said pistons being moved into a passageway closing position in response to a loss of fluid pressure within said discharge chamber;

said pistons being adapted to operate solely in response to differential fluid pressure within the assembly.

4,976,282

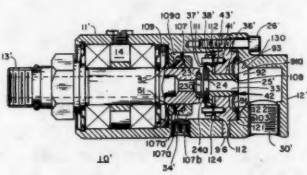
COOLANT UNION WITH FLUID ACTUATED SEAL ASSEMBLY

Zbigniew Kubala, Wroclaw, Poland, assignor to Deublin Company, Northbrook, Ill.

Filed Apr. 12, 1989, Ser. No. 336,755

Int. Cl.[5] F16L *27/00, 17/00*

U.S. Cl. 137—580 **20 Claims**



1. In a rotating union including a housing, a rotor rotatably mounted in the housing and adapted for coupling to a rotating device which is adapted to receive fluid conducted through the rotating union, a discharge passageway extending axially through the rotor, a fluid inlet chamber in the housing, and sealing means providing a rotating seal between said inlet chamber and the discharge passageway, said sealing means comprising:

rotating seal means mounted on the rotor to rotate with the rotor and having a seal surface,

non-rotating seal means located in the inlet chamber and having a seal surface opposing said seal surface of said rotating seal means, said non-rotating seal means being supported for movement within the inlet chamber axially of the housing between a first position in which said non-rotating seal means is spaced apart from said rotating seal means and a second position in which said seal surface of said non-rotating seal means engages said seal surface of said rotating seal means,

and fluid actuated means in the inlet chamber urging said non-rotating seal means to its first position in the absence of fluid pressure within said inlet chamber whereby said seal surface of said non-rotating seal means is maintained disengaged from said seal surface of said rotating seal means,

and said fluid actuated means responding to fluid pressure within said inlet chamber to move said non-rotating seal means to its second position, driving said seal surface of said non-rotating seal means into engagement with said seal surface of said rotating seal means and to maintain said seal surfaces in engagement.

4,976,283

FLUID FLOW REGULATOR

Dieter Wildfang, and Holger Nehm, both of Müllheim, Fed. Rep. of Germany, assignors to Dieter Wildfang KG, Müllheim, Fed. Rep. of Germany

Filed Jul. 10, 1989, Ser. No. 377,927

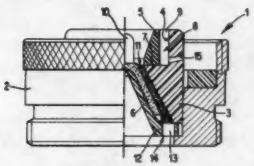
Claims priority, application Fed. Rep. of Germany, Jul. 9, 1988, 3823368; Nov. 30, 1988, 3840331; Nov. 30, 1988, 3840330

Int. Cl.[5] G05D *7/01*

U.S. Cl. 137—504 **46 Claims**

1. A fluid flow regulator comprising a hollow housing defining a channel with a fluid-admitting inlet and a fluid-discharging outlet and having a shoulder surrounding a portion of said channel between said inlet and said outlet and facing said inlet; an annular elastic flow restrictor including a portion abutting said should and having at least one aperture which is closed in the region of said shoulder; and a stud disposed substantially centrally of said channel and surrounded by and defining with said flow restrictor an annular passage for the flow of fluid

from said inlet to said outlet thereby the cross-sectional area of said passage and the rate of fluid flow to said outlet vary in



response to variations of fluid pressure and the resulting variations of the extent of deformation of the elastic flow restrictor.

4,976,284

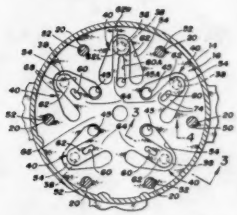
REED VALVE FOR PISTON MACHINE

Len A. Hovarter, Grand Island, N.Y., assignor to General Motors Corporation, Detroit, Mich.

Filed Jan. 16, 1990, Ser. No. 465,824

Int. Cl.[5] F16K *15/16*

U.S. Cl. 137—512.4 **2 Claims**



1. A flat suction valve disc having an integral center portion for attaching the disc in a piston machine and a plurality of integral suction reed valves extending from said center portion and each having a semi-circular distal valve portion for closing and opening a circular suction port in the piston machine, characterized by said valve portion encompassing a flat circular sealing land that is adapted to seal about the suction port over a land width that extends to the radius of the semi-circular valve portion and is just sufficient in radial extent to effect efficient sealing, an elongated by-pass suction port in each said valve located between the respective said semi-circular distal valve portion and said center portion and extending longitudinally of said valve to said sealing land so as to specially open to the suction port to the same degree as the outer perimeter of the semi-circular valve portion when the valve opens.

4,976,285

UNIVERSAL SELF-VENTING DRAIN VALVE

John Church; Victor R. Oelschlaegel, both of Modesto, and J. Donald Emery, Mariposa, all of Calif., assignors to Parker Hannifin Corporation, Cleveland, Ohio

Filed May 30, 1990, Ser. No. 530,773

Int. Cl.[5] F16K *24/00*

U.S. Cl. 137—588 **21 Claims**

1. A self-venting drain valve for draining liquid from a generally air tight container, said container including a wall, comprising:

a fluid hole in said wall for passing liquid therethrough;

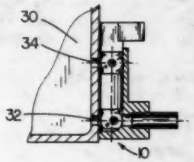
a vent hole in said wall for passing air therethrough, said vent hole disposed laterally of said fluid hole;

a movable member mounted for movement in a first rotational direction, said movable member having an axis of rotation generally parallel of said wall, said movable member including:

a first ball portion, said first ball portion including a first curved face portion adjacent said wall, said first curved face portion in blocking relation of said fluid hole when said member is in a first position;

said member further including a second ball portion, said second ball portion including a second curved face portion adjacent said wall, said second curved face portion in blocking relation of said vent hole when said member is in said first position;

said member further including fluid accepting means in said first curved face portion for accepting fluid delivered at said first hole, said fluid accepting means in fluid communication with said fluid hole when said member is in a second position and in a third position;



a liquid outlet in fluid communication with said fluid accepting means;

said member further including an air passage through said member, said air passage terminating at an air inlet opening in said second curved face portion, said air inlet opening in communication with said vent hole in said wall when said member is in the third position;

whereby when said member is in the first position said drain valve is closed, upon movement of said member in the first direction to the second position, said container is placed in a negative pressure condition, and upon further movement of said member in said first direction to a third position air is enabled to enter said container through said air passage enabling liquid to drain from said liquid outlet.

4,976,286

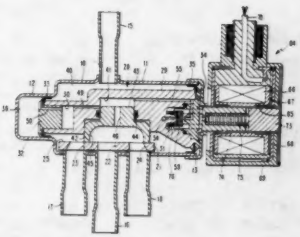
FOUR-WAY SLIDE VALVE

Peter Holborow, Califon, and Gary Kramer, Lincoln Park, both of N.J., assignors to Automatic Switch Company, Florham Park, N.J.

Filed Dec. 14, 1989, Ser. No. 452,918

Int. Cl.[5] F16K *31/40, 31/363*

U.S. Cl. 137—625.43 **17 Claims**



1. A four-way slide valve comprising:

(a) an elongated valve body having an inlet port, an outlet port, and two working ports,

(b) a slide assembly within the body movable longitudinally

thereof between two extreme positions, one extreme position being closer to one end of the valve body and the other extreme position being closer to the other end of the valve body, the slide assembly including:

I. a slide member for alternatively interconnecting the outlet port with one or the other of the working ports, depending upon which extreme position the slide assembly is in,

II. a first piston slidably engaging the valve body and defining a first chamber between itself and one end of the body, and

III. a second piston slidably engaging the valve body and defining a second chamber between itself and the other end of the body,

(c) passageway means within the slide assembly for providing communication between the first chamber and the outlet port,

(d) a pilot valve within the valve body for selectively providing communication alternatively between the second chamber and the inlet port or between the second chamber and the outlet port, so as to cause the slide member to move to one of its extreme positions or the other, and

a solenoid actuator, mounted on the valve body, for controlling the condition of the pilot valve, the actuator including an electric coil, an armature movable in response to energization and deenergization of the coil, and means extending into the valve body for transmitting movement of the armature to the pilot valve,

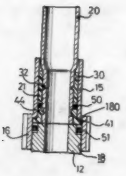
the pilot valve including a high pressure orifice through which the second chamber communicates with the inlet port, a low pressure orifice through which the second chamber communicates with the outlet port, and a valve member movable in response to movement of the armature between a position in which it closes the high pressure orifice and opens the low pressure orifice and a position in which it opens the high pressure orifice and closes the low pressure orifice.

4,976,287

COUPLING PORTION OF AN OUTLET PIPE OF A TAP

Guang Y. Sheen, No. 5, Lane 215, Yung Ho St., Taichung, Taiwan

Filed Jan. 25, 1990, Ser. No. 470,336
Int. Cl.[5] E03C *1/02*
U.S. Cl. 137—801 **2 Claims**



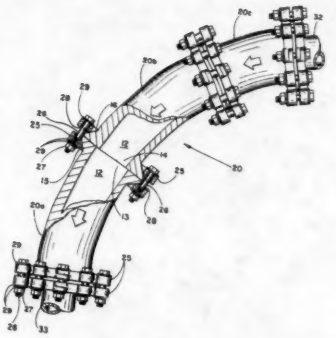
1. A coupling portion of an outlet pipe of a tap, said tap comprising a seat, two valves disposed on both ends of the seat, an outlet pipe rotatably provided on a center portion of said seat, a connecting pipe communicating said valves and said outlet pipe; characterized in that a sleeve is disposed on said center portion of said seat and communicates with said connecting pipe, a shoulder is formed in a middle portion of said sleeve; a collar which is slidable in an upper portion of said sleeve and embraces a lower end of said outlet pipe, wherein said lower end of said outlet pipe has a reduced diameter and has an upper annular groove and a lower annular groove formed on an outer surface thereof, an annular ring is formed in said collar and engages with said upper annular groove of said lower end of said outlet pipe, so that said lower end of said outlet pipe is stably held in said sleeve; and a retaining means is provided between said collar and said connecting pipe; an inner flange is formed on an upper end of said retaining means and extends radially inwards, and an outer flange is formed on a lower end of said retaining means and extends radially outwards, said outer flange of said retaining means bears against said shoulder of said sleeve and said inner flange of said retaining means is engaged in said lower annular groove of said lower end of said outlet pipe, so that said retaining means rotatably holds said lower end of said outlet pipe and, so that said outlet pipe is stably and rotatably held in said sleeve.

4,976,288

TUBING BEND FOR PNEUMATIC CONVEYING SYSTEM

James R. Steele, Stillwater, Minn., and Leonard Williams, Aylesbury, United Kingdom, assignors to Dynamic Air, Inc., St. Paul, Minn.

Filed Jun. 22, 1989, Ser. No. 370,253
Int. Cl.[5] D03D *21/00*; F16L *13/04*
U.S. Cl. 138—120 **4 Claims**



1. Segmented tubing bend for use in a system for pneumatically conveying granular materials comprising:

a plurality of arcuate conduits; each of said conduits having a constant radius of curvature and a hollow bore with an input opening at one end of said bore narrowing at a constant gradient to a smaller outlet opening at the other end; and

means for making a substantially air tight releasable attachment of the outlet end of one of said conduits to the input end of another of said conduits to provide an air pressure drop at the input of said another conduit.

4,976,289

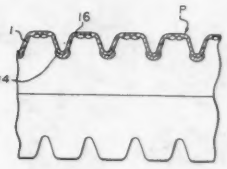
CORRUGATED PIPE

Noboru Umemori; Osamu Kouda, both of Hiratsuka, and Yukio Horii, Nagahama, all of Japan, assignors to Mitsubishi Plastics Industries Limited, Tokyo, Japan

Filed Jun. 7, 1989, Ser. No. 362,660
Claims priority, application Japan, Jul. 5, 1988, 63-167534
Int. Cl.[5] F16L *9/00*
U.S. Cl. 138—122 **1 Claim**

1. A corrugated pipe made of a strip-like metallic material wound in a spiral form and covered in its entirety with a first synthetic resin layer, wherein said strip material has a substantially U-shaped recess in cross section at a central portion in a longitudinal direction thereof and both edges of said strip material comprise ring-like projections, wherein a second synthetic resin layer is formed at an outer periphery of a joining portion of adjoining ones of said edges comprising ring-like

projections; a third synthetic resin layer formed at a back side of the central portion having the recess and a fourth synthetic resin layer covering a front side of the central portion having the recess.

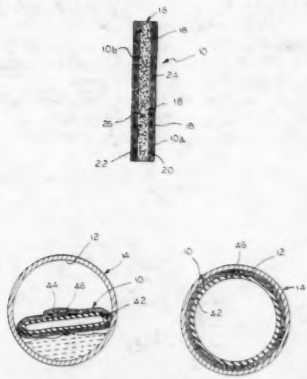


4,976,290

TUBULAR MEMBER HAVING A LINER

Robert J. Gelin, Newark, Ohio, and Richard D. Blackmore, Northbrook, Ill., assignors to Ozite Corporation, Libertyville, Ill.

Filed Jun. 12, 1989, Ser. No. 364,858
Int. Cl.[5] F16L *9/14, 55/18*
U.S. Cl. 138—141 **6 Claims**



1. A tubular member having a liner adhesively affixed to an inner surface thereof, comprising:

a rigid tubular shell having an inner surface and an outer surface defining said tubular member;

said liner including a porous material formed from a plurality of needle-punched unwoven fibers, said porous material having a pair of oppositely facing surfaces;

said liner also including a first mat of finespun woven filaments of glass defining an inner surface of said liner, said inner surface of said liner being generally coextensive with said porous material, said first mat being secured to an inwardly facing one of said oppositely facing surfaces of said porous material;

said liner also including a second mat of finespun woven filaments of glass defining an outer surface of said liner, said outer surface of said liner being generally coextensive with said porous material, said second mat being secured to an outwardly facing one of said oppositely facing surfaces of said porous material; and

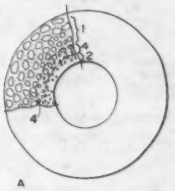
an adhesive impregnating said first mat, said porous material and said second mat of said liner, said adhesive bonding said outer surface of said liner to said rigid tubular shell, said adhesive also bonding said first mat, said porous material and said second mat of said liner.

4,976,291

CENTRIFUGALLY MOLDED CONCRETE COMPOSITE PIPE

Nobuyoshi Yoshikawa, Omiya, and Hiroshi Asano, Nagoya, both of Japan, assignors to Teikoku Hume Pipe Co., Ltd., Tokyo and Noritake Co., Limited, Nagoya, both of, Japan

Continuation of Ser. No. 168,869, Mar. 16, 1988, abandoned.
This application Oct. 3, 1989, Ser. No. 418,735
Claims priority, application Japan, Mar. 24, 1987, 62-068034
Int. Cl.[5] F16L *9/08*
U.S. Cl. 138—175 **9 Claims**



1. A centrifugally molded concrete-type composite pipe, comprising

a cylindrical, centrifugally formed concrete layer including aggregates;

a cylindrical, corrosion protective layer concentrically laminated inwardly adjacent said cylindrical concrete layer, said corrosion protective layer being formed of a mixture of resin and fine and coarse aggregates with fine aggregates distributed near the inner surface of the corrosion protective layer;

an intermediate layer composed of mixed resin and concrete including coarse aggregates centrifugally precipated from the corrosion protective layer and penetrating into said concrete layer and formed in a boundary region between said cylindrical concrete layer and said cylindrical corrosion protective layer having physical properties intermediate those of said concrete layer and said corrosion protective layer,

said composite pipe being at least in part formed by centrifugal action due to rotation of said cylindrical concrete layer and said resin and fine and coarse aggregate containing corrosion resistant layer about their common longitudinal axis while the concrete and resin are not completely hardened in such a manner that part of said resin of said corrosion protective layer is intermixed with said concrete layer at the interface between said concrete layer and said adjacent corrosion protective layer, said intermixing being the result of said contrifugal action.

4,976,292

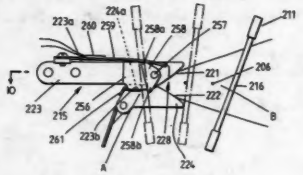
WEFT END TENSIONING AND DETECTING DEVICES FOR SHUTTLELESS LOOM

Hiroyasu Matsumoto, Ishikawa, Japan, assignor to Tagawa Kikai Co., Ltd., Janazawa, Japan

Filed Jun. 15, 1989, Ser. No. 366,736
Claims priority, application Japan, Jun. 27, 1988, 63-158449; Aug. 3, 1988, 63-193901
Int. Cl.[5] D03D *51/38*
U.S. Cl. 139—194 **10 Claims**

1. A weft end treating device for a shuttleless loom including a tension apply means which comprises a yarn holding device fixedly mounted on a frame of the loom outside the selvage of a fabric on the loom on the weft arriving side of the loom, and pushing dents disposed opposite to the yarn holding device,

said yarn holding device comprising a plurality of weft end bending members forming a weft guide space and arranged by a supporting means in a zigzag relationship to form a zigzag path, so that extremity of an inserted weft is pushed into the zigzag path through the weft guide space by means of the pushing dents, said weft end bending members each comprising an upper blade and a lower blade which have inclined edges at one end and are arranged by a supporting means alternately with the lower edge of the upper blade and the upper edge of the lower blade slightly overlapping each other so as to form the zigzag path therebetween and to form a guide space.



4,976,293

BUILT UP SEAM FOR PAPERMAKERS FABRIC

W. Daniel Aldrich, Starkville, Miss., assignor to Niagara Lockport Industries Inc., Quincy, Fla.

Filed Jan. 31, 1990, Ser. No. 472,847

Int. Cl.[5] F16G *3/02*; D21F *7/10*

U.S. Cl. 139—383 AA **6 Claims**

1. In a papermakers fabric having a plurality of machine direction yarns interwoven with a plurality of cross direction yarns of a predetermined cross sectional size and in which a seam for joining the ends of the fabric is formed by providing a plurality of loops extending outwardly of each end of the fabric in the machine direction, which loops are brought into interengaged relationship for insertion through such loops of a pin, the improved seam construction comprising

providing in the weave proximal the seam said cross direction yarns having a cross sectional size greater than said predetermined size, whereby is provided a weave portion of greater thickness proximal the pin seam to protect the seam in use.

4,976,294

METHOD AND APPARATUS FOR MAKING SPECIFIED-LENGTH WIRES FOR WIRE HARNESS

Shigeji Kudo; Suzuki Sanae; Hideaki Morita, and Hiroo Suzuki, all of Gotenba, Japan, assignors to Yazaki Corporation, Minato, Japan

Filed Jun. 9, 1989, Ser. No. 363,832

Claims priority, application Japan, Jun. 13, 1988, 63-143556

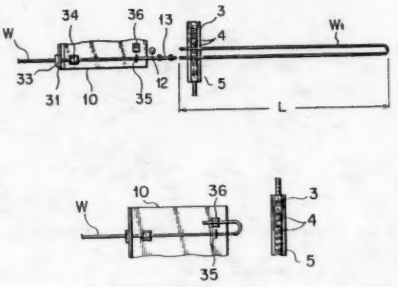
Int. Cl.[5] B21F *1/00*; B23P *23/00*

U.S. Cl. 140—102 **10 Claims**

1. A method of making specified-length wires for a wire harness from continuous wires, comprising the steps of:

fixing a front end of a U-bent continuous wire on a holding member;

transferring a U-bent portion onto another holding member and fixing it thereto and pulling the U-bent wire to pay out a predetermined amount thereof; and



cutting the U-bent, pulled wire at a portion substantially opposite to the front end.

4,976,295

APPARATUS FOR FILLING CONTAINERS WITH CARBONATED LIQUIDS UNDER COUNTERPRESSURE AS DISPENSED HAVING DIFFERENT FILLING CHARACTERISTICS BY ADJUSTING PRESSURE DIFFERENTIAL WITHOUT CHANGING FLOW CONTROL MECHANISM

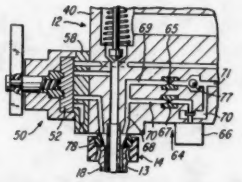
Ludwig Clüsserath, Bad Kreuznach, Fed. Rep. of Germany, assignor to Seitz Enzinger Noll Maschinenbau Aktiengesellschaft, Mannheim, Fed. Rep. of Germany

Division of Ser. No. 196,731, May 20, 1988. This application Sep. 12, 1989, Ser. No. 406,050

Claims priority, application Fed. Rep. of Germany, May 22, 1987, 3717256

Int. Cl.[5] B67C *3/06*; B65B *31/00*

U.S. Cl. 141—39 **10 Claims**



1. An apparatus for filling a carbonated liquid into a container under counterpressure, said apparatus comprising:

a liquid container for said liquid that is to be dispensed;

a chamber for pressurizing gas;

a return gas chamber for gas or gas mixture displaced from a container that is being filled, with said return gas chamber including an outlet that can be opened to the atmosphere;

at least one filling element, which includes a long filling tube, a controlled liquid flow valve, and a controlled pressurizing gas valve arrangement including a connecting means, with said at least one filling element being connected to said liquid container, said chamber for pressurizing gas, and, via said connecting means of said pressurizing gas valve arrangement, to said return gas chamber, with said connecting means being provided with a flow control mechanism and serving to withdraw displaced gas or gas mixture from said container that is being filled, and with said connecting means being connected to said outlet of said return gas chamber; and

a regulating valve that is operatively connected to said outlet of said return gas chamber, with said regulating valve being adapted to be opened when the pressure that is to be regulated in said return gas chamber is exceeded.

4,976,296

FILLING MACHINES

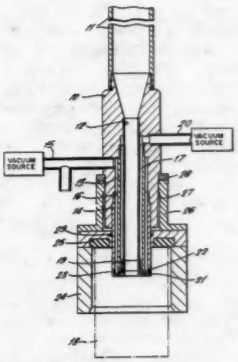
Peter E. Pope, Frinton-On-Sea, United Kingdom, assignor to Portals Engineering Limited, Essex, United Kingdom

Filed Jul. 24, 1989, Ser. No. 383,583

Claims priority, application United Kingdom, Jul. 25, 1988, 8817708

Int. Cl.[5] B65B *1/16, 31/04*

U.S. Cl. 141—46 **10 Claims**



1. A dispensing unit for particulate material comprising, a nozzle having an outlet for delivery of particulate material to a container, means to seal an open end of the container around the nozzle for filling container, first vacuum applying means for evacuating the container applied to the nozzle, said first vacuum applying means having an inlet means located at the lower end of the nozzle adjacent to the nozzle outlet, the inlet means including means to prevent the flow of particulate material through the inlet means when the level of particulate material reaches the level of the inlet means to block the inlet means, a porous member located in the nozzle, said porous member and said inlet means being at substantially the same elevation, second vacuum applying means for drawing at said porous member a vacuum which is less than the vacuum at the inlet means of said first vacuum applying means, said second vacuum applying means being operable with said porous member to consolidate and prevent release of material from the outlet from the flow of material through the outlet ceases from the container is filled to the elevation of the nozzle outlet so that the container can be removed from the dispensing unit without risk of further discharge from the outlet nozzle.

4,976,297

FUNNEL HAVING IMPROVED LIQUID FILL LEVEL INDICATOR

Arganius E. Peckels, Rte. 2, P.O. Box 489, Ogilvie, Minn. 56358

Continuation of Ser. No. 220,573, Jul. 20, 1988, abandoned, which is a continuation-in-part of Ser. No. 196,501, May 20, 1988. This application Nov. 17, 1989, Ser. No. 438,586

Int. Cl.[5] B65B *39/04;* **B67C** *11/00*

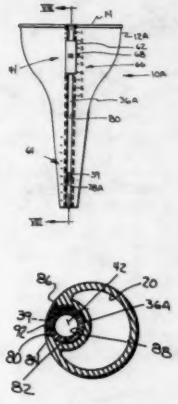
U.S. Cl. 141—95 **19 Claims**

1. A liquid funnel having structure for indicating when a liquid receiving vessel is filled, comprising

(a) a generally tubular funnel body having an inlet end, an outlet end, and an outer wall having a length extending between said ends;

(b) an elongate upright slot extending along the length of the outer wall from adjacent the inlet end to adjacent the outlet end, said slot being open through the outside of said outer wall of the body;

(c) a discrete air tube having an air inlet adjacent the body outlet end and an air outlet adjacent the body inlet end, said air tube being fitted within and being extended upright in said slot;



(d) indicator means on said air tube outlet end for indicating air has stopped flowing through said tube upon the vessel being filled to the air inlet; and

(e) funnel body outer surface means at said outlet end being contiguous, and jointly defined in part by said funnel body and in part by said air tube for effectively sealing said funnel to a liquid inlet of the vessel.

4,976,298

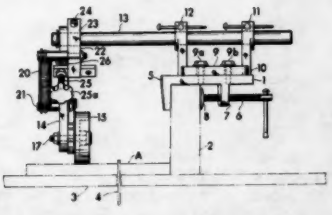
ANTI-KICKBACK HOLD DOWN DEVICE

Jeremy H. Gibson, Eastlake, Ohio, assignor to Leichtung Inc., Cleveland, Ohio

Filed May 17, 1990, Ser. No. 524,784

Int. Cl.[5] B27C *1/12*

U.S. Cl. 144—249 B **9 Claims**



1. An anti-kickback hold down device, comprising, means for mounting the device adjacent a saw means, a hold down arm carried by said mounting means for swinging support of said arm, a wheel on said arm to engage and roll along a workpiece, an element to exert downward pressure on said arm and wheel and on said workpiece, said wheel facilitating movement of said workpiece in one direction whilst in engagement with said wheel and means to prevent opposite rotation of said

wheel and thus prevent movement of said workpiece in the opposite direction.

4,976,299

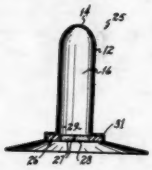
STERILE DISPOSABLE COVER FOR A CYLINDRICAL HANDLE

Harry M. Bickelman, 9017 Wooded Glen, Louisville, Ky. 40220

Filed Jun. 27, 1989, Ser. No. 371,939

Int. Cl.[5] B65D *65/02*

U.S. Cl. 150—155 **6 Claims**



1. A sterile disposable cover for a handle of an operating room fixture comprising:

a hollow member having a first closed end and a second opened end having an opening adapted to receive a handle of the operating room fixture;

a flange extending radially outward from said hollow member;

a flexible retention member fixed at the juncture of the flange and opened end partially restricting the opening of the hollow member and adapted to engage handles of operating room fixtures of different dimensions.

4,976,300

PNEUMATIC TIRE PROFILE

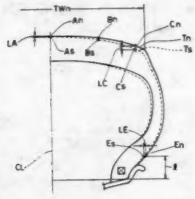
Kenji Takehara, and Kenji Saitou, both of Kobe, Japan, assignors to Sumitomo Rubber Industries, Ltd., Hyogo, Japan

Filed Apr. 21, 1989, Ser. No. 341,218

Claims priority, application Japan, Apr. 22, 1988, 63-101010; May 11, 1988, 63-115393

Int. Cl.[5] B60C *3/04*

U.S. Cl. 152—454 **1 Claim**



1. A pneumatic tire having a profile comprising:

a radial distance (LA) between a standard first point (An) on the tire equator on the tread surface (Tn) when the tire is inflated to a standard internal pressure and a 10% first point (As) on the tire equator on the tread surface (Ts) when the tire is inflated to 10% of said standard internal pressure is smaller than 1.0 mm;

a radial distance (LC) between a standard third point (Cn) on said tread face (Tn) spaced apart 0.45 times the tread width (TWn) when inflated to the standard internal pressure from said standard first point (An) and a 10% third point (Cs) defined as the intersection of the radial line passing through said standard third point (Cn) with said tread face (Ts) is not smaller than 1.0 mm and smaller than 4.0 mm;

the ratio (LC/LA) of the distance, (LC) to the distance (LA) is not smaller than 4.0;

the common logarithm $\log_{10}$ (RCN/RSn) of the ratio (RCn/RSn) of a standard inner radius (RCn) defined as the radius of curvature of a circular arc passing said standard first point (An) and two standard second points (Bn) on the tread face (Tn) centered on the standard first point (An) and spaced apart each from the other by 0.5 times said tread width (TWn) to a standard outer ratios (RSn) defined as the radius of curvature of a circular arc passing the standard first point (An) and the two standard third point (Cn) one on each side thereof is not less than 0.1 and not more than 0.7;

said standard inner radius (RCn) is more than 2.7 times and less than 5.0 times a value (TWn/S) obtained by dividing said tread with (TWn) by the tire aspect ratio (S) which is the ratio (Hn/SWn) of the height (Hn) of the tire to the maximum width (SWn) of the tire when inflated to the standard internal pressure;

the absolute value la-bl of the difference between the tread thickness (a) at the standard first point (An) and the tread thickness (b) at the standard second points (Bn) is not more than 0.3 mm;

the thickness (B-C) obtained by subtracting the tread thickness (c) at the standard third point (Cn) from the tread thickness (b) is not less than 0.5 mm and not more than 3.0 mm; and

an axial distance (LE) between a standard forth point (En) on the sidewall face spaced apart 30 mm from the base of bead of the tire in the radial direction when inflated to the standard internal pressure and a 10% forth point (Es) on the sidewall face spaced apart 30 mm from the base of the bead in the radial direction when inflated to 10% of the standard internal pressure is not more than 1.0 mm.

4,976,301

FOLDED PRESTRUNG SHADE AND PACKAGE

Madlyn Easley, 53 Bretton Rd., West Hartford, Conn. 06119, and Robin Fisher, 23 Charter Oak Pl., Hartford, Conn. 06103

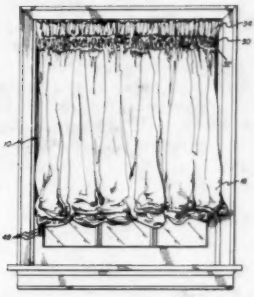
Continuation-in-part of Ser. No. 653,317, Sep. 24, 1984, Pat. No. 4,899,796. This application Jan. 30, 1985, Ser. No. 696,437

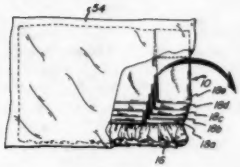
Int. Cl.[5] A47H *5/00*

U.S. Cl. 160—84.1 **8 Claims**

1. A drapery package assembly, including: a prestrung and unmounted drapery article comprised of a panel of supple material having means defining a rod-receiving sleeve portion extending laterally along the upper margin thereof and being compressible therealong for hanging said article in a laterally gathered condition, a multiplicity of guide elements arranged in a plurality of rows and a plurality of columns on one side of said panel, and a plurality of drawstrings attached to the lower portion of said panel at laterally spaced locations corresponding to said columns of guide elements, said drawstrings being threaded upwardly through said guide elements to the uppermost row thereof, and being guided thereby to one lateral edge of said panel for simultaneous operation of the drapery article when installed to elevate said lower portion thereof, such operation causing said panel to fold upon itself longitudinally along generally laterally extending natural fold lines at levels corresponding to said rows of guide elements other than said uppermost row, at least the portion of said panel other than said sleeve portion and said lower portion being of uniform suppleness throughout, said unmounted, drapery article being folded upon itself in a series of overlapping pleats formed along said other rows of guide elements, substantially without gathering in the lateral direction and substantially without longitudinally extending creases; and means for maintaining said article in such pleat-folded condition, whereby said drapery article requires substantially no extension from its pleated-folded condition to enable insertion of a mounting rod

through said sleeve portion for installation, and whereby said article, when hung, will be substantially free of creases, other





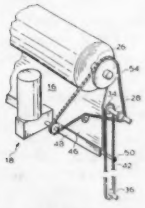
than those that extend generally laterally along said natural fold lines and are associated with said pleats.

4,976,302

APPARATUS FOR OPENING AND CLOSING ROLL-UP DOOR

Douglas B. Taylor, Barrie, Canada, assignor to M & I Door Systems Limited, Barrie, Ontario, Canada

Filed Dec. 6, 1988, Ser. No. 280,630
Claims priority, application Canada, Dec. 18, 1987, 554847
Int. Cl.[5] E06B *9/20*
U.S. Cl. 160—310 **10 Claims**



1. A roll door assembly comprising:

a flexible curtain having an inner end, an outer end and side edges,

a curtain winding and unwinding mechanism,

a rotatable curtain roll, said inner end of said curtain being mounted to said curtain roll,

a pair of generally parallel, spaced apart guide channels, said side edges being received in said guide channels for travel therein,

a rotatable guide roll adapted to guide said curtain during travel, relative to said guide channels,

said curtain mechanism comprising a curtain sprocket mounted to said curtain roll, a guide sprocket supported about said guide roll and drive means to rotatingly drive said curtain sprocket and guide sprocket concurrently at a constant speed of rotation,

travel member means secured to said outer end of said curtain for travel therewith, said travel member engaging said guide roll throughout its travel such that said guide roll rotates in response to linear travel of said travel member means with said outer end,

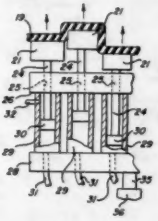
adjusting means adapted to store and release energy connected between said guide sprocket and said guide roll to accommodate a difference between turning forces developed by said guide sprocket driven at a constant speed of rotation and said guide shaft driven at a variable speed of rotation.

4,976,303

METHOD OF AND APPARATUS FOR FORMING SAND MOLDS

Thomas E. Wuepper, Alger; Keith R. Grauherr, Twining; Orren R. Tate, Cadillac, and Alfred D. Philo, Manton, all of Mich., assignors to CMI International, Inc., Southfield, Mich.

Filed Feb. 15, 1990, Ser. No. 480,302
Int. Cl.[5] B22C *15/02, 15/08*
U.S. Cl. 164—29 **11 Claims**



1. An apparatus for forming sand casting molds, including a flask formed of an open frame cope and drag, which may be aligned together and filled with sand to encompass a pattern arranged between them to form a sand mold having a casting cavity, and with the frames having open, inner ends that are arranged together and at which the pattern is positioned, and open, outer ends through which sand may be inserted and compacted towards the pattern, comprising:

each frame having a squeeze plate positioned at the frame open, outer end to overlay and substantially cover a sand filling contained within said frame;

means for moving each of the squeeze plates towards each other, that is, towards the frame inner ends and a pattern located within the frame portions defining their inner ends, for compacting sand within one frame towards the other frame and against the pattern;

each squeeze plate being formed of numerous, closely adjacent, separate and separately movable, plate-like sections, which together form a substantially coplanar plate surface for pressing against the sand filling within its respective frame;

said means for moving each squeeze plate including means for simultaneously moving all of the sections of each squeeze plate together, as a single group, towards and away from the opposite squeeze plate, and including means for separately moving each individual section towards and away from the opposite plate;

sheet means for continuously substantially covering said squeeze plates and for enabling contact of the sand filling within said frames, said sheet means formed from a resilient material for enabling independent movement of said plate-like sections such that said sheet means deforms in an area in response to separate movement of the independent

plate-like sections and returns to its normal position upon return of the independent plate-like sections;

whereby the squeeze plates together may apply a differential compacting of the sand between them by moving their respective sections different pre-selected amounts to thereby form a sand mold having relatively harder and softer sand portions therein.

9. A method for forming differently compacted areas within a sand casting mold having a mold cavity within which molten metal is cast, comprising the steps of:

aligning a cope frame and a drag frame with a pattern arranged between and within them and filling the frames with sand;

arranging a sheet of resilient material covering the open end of ech of said frames;

arranging squeeze plates, each formed of numerous, adjacent, separate, approximately coplanar sections overlying the opposite remote ends of the frames and positioned adjacent said sheet of resilient material;

simultaneously compacting the sand fillings, within both the frame, inwardly of the frames, towards the pattern, by moving the pair of squeeze plates towards each other for applying pressure to the sheets of resilient material to transmit the pressure through the sheets to the sand fillings within the aligned frames;

separately moving towards each other for predetermined distances, pre-selected opposing squeeze plate sections for additionally compacting sand between them, said resilient sheet deforming in an area in response to the separate movement of the opposing squeeze plate sections and returning to its normal position upon return of the squeeze plate sections, whereby the sand fillings within the frames are formed with areas having predetermined greater compactness than other areas of the fillings;

separating the frames and removing the pattern to provide the casting cavity in the sand mold;

repositioning the frames in alignment with the inner ends adjacent one another, to align the compacted sand cope and drag mold sections formed in the frames to, thereby, form the sand mold.

4,976,304

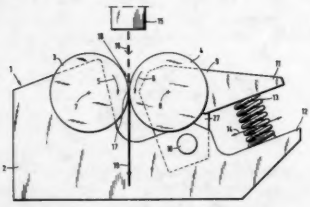
APPARATUS FOR MANUFACTURING ROLLABLE SHEET FROM METAL MELTS

Achim R. Büchner, Meerbusch, Fed. Rep. of Germany, assignor to Max-Planck-Institut fur Eisenforschung GmbH, Dusseldorf, Fed. Rep. of Germany

Continuation of Ser. No. 142,728, Jan. 11, 1988, abandoned. This application Apr. 26, 1989, Ser. No. 344,515

Int. Cl.[5] B22D *11/06*

U.S. Cl. 164—428 **5 Claims**



1. An apparatus for continuously producing rollable sheet metal directly from molten metal by a rolling action, said apparatus comprising:

(a) two cooled rollers rotatably mounted side-by-side, at least one of said rollers mounted in a rocker assembly pivotable about an axis, said rollers forming a gap therebetween;

(b) drive means connected to each of said rollers for rotating said rollers;

(c) means for pouring molten metal between said rollers in order to form a pool of molten metal above said gap; and

(d) a lever arm cooperatively attached about said axis, said lever arm compressing a spring wherein the position of said spring is adjustable along the length of said lever arm, whereby the force to be exerted by said spring may be changed by adjusting the position of said spring along said lever arm, and wherein the width of said gap is automatically adjustable for regulating the depth or volume of the molten pool in accordance with the force exerted onto said rollers by the rolling action, whereby the rolling force-gap-width relationship acts in accordance with Hooke's Law; wherein $F = -kx$, where k is the force constant of the spring, x is the deflected distance and F is the resulting force.

4,976,305

METHOD OF AND APPARATUS FOR CONTROLLING DIE TEMPERATURE IN LOW-PRESSURE CASTING PROCESS

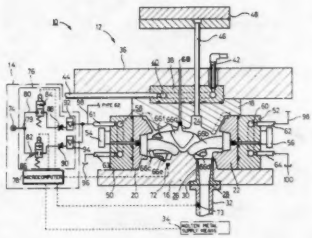
Kouji Tanaka; Syugo Kondo; Takeshi Imura; Katsuhiko Ando, and Shigemitsu Nakabayashi, all of Sayama, Japan, assignors to Honda Giken Kogyo Kabushiki Kaisha, Tokyo, Japan

Filed Dec. 1, 1988, Ser. No. 278,458

Claims priority, application Japan, Dec. 1, 1987, 62-303952; Dec. 1, 1987, 62-303953; Dec. 1, 1987, 62-303954

Int. Cl.[5] B22D *18/04, 30/00*

U.S. Cl. 164—458 **43 Claims**



33. A method of controlling the temperature of a casting die in a low-pressure casting process, the casting process pressuring the surface of molten metal stored in a closed container to fill the molten metal in a die cavity defined in the casting die, said method comprising the steps of:

setting a plurality of temperature zones and a reference die temperature range based on casting conditions to be employed;

detecting the temperature of said casting die before the molten metal is filled in said die cavity under pressure;

comparing the detected temperature of the casting die with the reference die temperature range to determine whether said detected temperature falls within the preset reference die temperature range or one of the plurality of temperature zones;

supplying a variable amount of cooling water for each casting to the casting die when the comparing determines the die temperature to be above the reference die temperature range and in one of the plurality of temperature zones, the amount of cooling water supplied being dependent upon which temperature zone the die temperature falls within; and

starting to fill the molten metal in said die cavity when said detected temperature of the casting die falls within said reference die temperature range.

4,976,306

COMBINED CONTINUOUS CASTING AND ROLLING

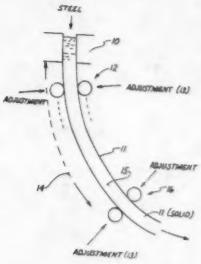
Fritz-Peter Pleschiutschnigg, Duisburg; Lothar Parschat, Ratingen; Armin Barau; Werner Rahmfeld, both of Muelheim; Gerd Moellers, Oberhausen; Hans-Juergen Ehrenberg, Duesseldorf, and Hans G. Eberhardt, Duisburg, all of Fed. Rep. of Germany, assignors to Mannesmann AG, Duesseldorf, Fed. Rep. of Germany

Filed May 9, 1989, Ser. No. 349,599

Claims priority, application Fed. Rep. of Germany, May 25, 1988, 3818077

Int. Cl.[5] B22D *11/06, 11/12*

U.S. Cl. 164— 76 8 Claims



1. Method for continuous casting utilizing a mold and pouring molten metal into the mold to obtain a flat stock with a thickness below 100 mm and including withdrawing the flat stock by means of at least one roll pair, the flat stock being partially solidified, and reducing by means of said rolls the thickness of the stock upstream from the point of complete solidification by at least 10% but not more than 70% of the thickness of the flat stock; and providing further reduction in thickness of the flat stock by at least 30% downstream from the point of complete solidification to obtain a final product, the improvement comprising:

the flat stock having a thickness not below 50 mm;

using exclusively internally cooled rollers for reducing the flat stock; and

reducing the thickness of the flat stock downstream from the point of complete solidification but at a point where the temperature is only little below the solidus temperature.

4,976,307

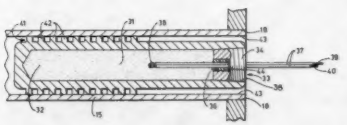
APPARATUS AND METHOD FOR SEALING TUBES

Charles Hall, 7763 Kennesaw Dr., West Chester, Ohio 45069, and Michael Fry, 1558 Whittlou Ave., Cincinnati, Ohio 45224

Filed Nov. 17, 1988, Ser. No. 272,554

Int. Cl.[5] F28F *11/06;* F16L *55/11*

U.S. Cl. 165—76 18 Claims



1. A device for sealing the internal peripheral surface of a tube, comprising:

(a) a plug body, said plug body including means for sealing the internal peripheral surface of a tube in response to the elevation of the temperature of said sealing means above a predetermined level;

(b) a heat source adapted for elevating the temperature of said sealing means above a predetermined level, said heat source comprising a combustible exothermic compound and being operational to selectively raise the temperature of said sealing means in response to a predetermined activation; and

(c) means for activating said heat source thereby effecting the temperature elevation of said sealing means above the predetermined level so as to seal the internal peripheral surface of the tube with the sealing means.

4,976,308

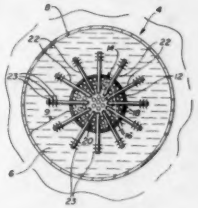
THERMAL ENERGY STORAGE HEAT EXCHANGER

Amir Faghri, Dayton, Ohio, assignor to Wright State University, Dayton, Ohio

Filed Feb. 21, 1990, Ser. No. 483,385

Int. Cl.[5] F28D *15/02, 20/00*

U.S. Cl. 165—10 54 Claims



1. A heat exchanger comprised of

a shell having one or more inlets and one or more outlets adapted for cooling fluid flow;

a tube disposed within said shell defining an annular volume between said tube and said shell, said annular volume adapted for cooling fluid flow;

a heat sink disposed in said tube; and

a plurality of heat pipes extending outward from said heat sink into said annular volume,

said plurality of heat pipes and said tube adapted to exchange thermal energy between said cooling fluid and said heat sink.

4,976,309

AIR CONDITIONER FOR A VEHICLE

Gennady V. Åverin, Zaporozhie, U.S.S.R., assignor to Zaporozhsky Avtomobilny ZaVod "Kommunar" (Proizvodstvennoe Objedinenie "AV to ZAZ" , Zaporozhie, U.S.S.R.

PCT No. PCT/SU89/00034, § 371 Date Nov. 6, 1989, § 102(e) Date Nov. 6, 1989, PCT Pub. No. WO89/08032, PCT Pub. Date Sep. 8, 1989

PCT Filed Feb. 3, 1989, Ser. No. 444,145

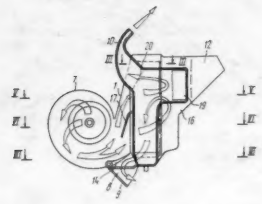
Claims priority, application U.S.S.R., Mar. 4, 1988, 4387009; Nov. 23, 1988, 4604865

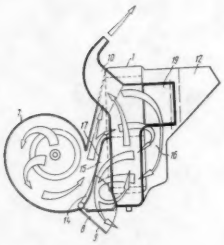
Int. Cl.[5] B60H *3/00;* F25B *29/00*

U.S. Cl. 165—42 2 Claims

1. An air conditioner for a vehicle, comprising a housing (1) accommodating an evaporator (2) and a heater (3) which are connected to a compressor and to an engine cooling system of the vehicle, respectively, as well as a fan (7) and controlled gates (9, 13) provided in hot and cool air ducts (8, 12), c h a r a c t e r i z e d in that the evaporator (2) and the heater (3) are made in the form of a stack of alternating heat exchange plates having passages (4, 5) for a heat carrier, whereas the fan (7) is installed upstream the stack of the heat exchange plates in the air flow, an auxiliary controlled gate (14) of the hot air duct (8) being provided between the fan (7) and the stack of the heat exchange plates, which is mounted for movement between two positions so that in the first position the gate shuts off a part of the stack of the heat exchange plates and defines with the shut-off part of the stack of the heat exchange plates and with the housing (1), a front-end space (15) communicating with the

hot air duct (8) and in the second position the gate uncovers the entire surface area of the stack of the heat exchange plates to shut off the hot air duct (8), and a rearend space (16) is defined





downstream the stack of the heat exchange plates in the housing (1) communicating with the cool air duct (12) when its gate (13) is in the open position and with the hot air duct (8) when the gate (13) is in the shut position.

4,976,310

SUPPORT MEANS FOR A HEAT EXCHANGER TO RESIST SHOCK FORCES AND DIFFERENTIAL THERMAL EFFECTS

Alfred Jabs, Grobenzell, Fed. Rep. of Germany, assignor to MTU Motoren- Und Turbinen-Union Munchen GmbH, Munich, Fed. Rep. of Germany

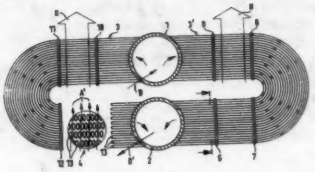
Filed Nov. 30, 1989, Ser. No. 444,744

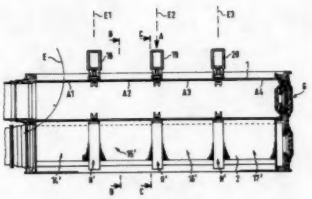
Claims priority, application Fed. Rep. of Germany, Dec. 1, 1988, 3840460

Int. Cl.[5] F28F *9/00*

U.S. Cl. 165—82 **29 Claims**

1. A heat exchanger comprising a tubular inlet manifold and a tubular outlet manifold for a fluid each having a longitudinal axis, a tube matrix connected to said inlet and outlet manifolds for conveying fluid from the inlet manifold to the outlet manifold, said tube matrix projecting laterally from said inlet and outlet manifolds into the path of travel of a hot gas stream so that the fluid is heated as the fluid travels through the tube matrix from the inlet to the outlet manifold, said tube matrix including heat exchange tubes of U-shape having bend regions in which the fluid being heated undergoes reversal of direction of flow, a housing containing the manifolds and the tube matrix, the hot gas stream being conveyed through the housing for heat exchange with the tube matrix and the fluid therein, a plurality of spaced baffle walls extending transversely of said manifolds in said tube matrix to subdivide said tube matrix into a plurality of sections disposed longitudinally along said manifolds, said manifolds each having opposite ends, means supporting said ends of the manifolds from said housing for movement along said longitudinal, a plurality of supports spaced longitudinally and along the length of said manifolds an extending transversely thereof, means connecting said supports to said housing in the vicinity of the bend regions of the heat exchange tubes such that said supports and said housing can undergo relative movement due to differential thermal expansion and contraction, means rigidly connecting said manifolds





to one of said supports and means connecting another of said supports to said manifolds to provide relative movement therebetween longitudinally of said manifolds.

4,976,311

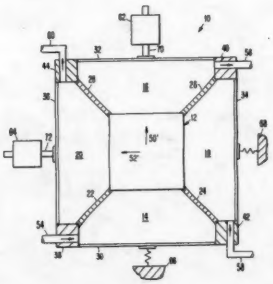
HEAT EXCHANGER EMPLOYING FLUID OSCILLATION

Ulrich H. Kurzweg, Gainesville, Fla., assignor to University of Florida, Gainesville, Fla.

Filed Nov. 18, 1988, Ser. No. 273,078

Int. Cl.[5] F28F *13/10*

U.S. Cl. 165—84 **35 Claims**



1. A heat exchange device comprising:

a first fluid flow path means for directing a first fluid through said heat exchange device;

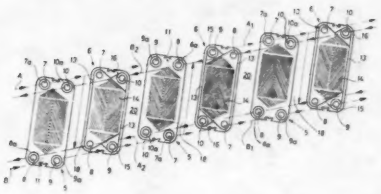
a second fluid flow path means for directing a second fluid through said heat exchange device; said first and said second fluid flow paths being adapted to place said first and said second fluids in heat transfer communication with each other; and

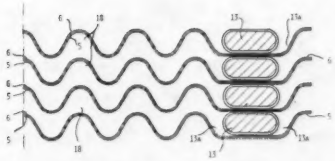
means for inducing resonant axial oscillations in said first and said second fluids in directing said first and second fluids axially through said first and said second fluid flow path means.

4,976,313
PLATE HEAT EXCHANGER WITH A DOUBLE-WALL STRUCTURE

Arthur Dahlgren; Magnus Källrot, both of Lund, and Mats Strömblad, Bjärred, all of Sweden, assignors to Alfa-Laval Thermal AB, Sweden

PCT No. PCT/SE87/00478, § 371 Date Mar. 22, 1989, § 102(e) Date Mar. 22, 1989, PCT Pub. No. WO88/03253, PCT Pub. Date May 5, 1988
PCT Filed Oct. 19, 1987, Ser. No. 340,419
Int. Cl.[5] F28F *3/04*
U.S. Cl. 165—167 6 Claims



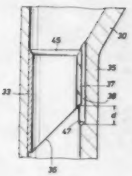


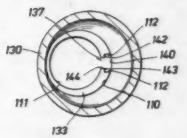
1. A plate heat exchanger comprising a series of heat exchange plates arranged in a pack, including alternate plates and other plates intermediate the alternate plates, each plate being generally rectangular with a pressed corrugation pattern of ridges and valleys and having through flow ports in corner portions thereof for two heat exchanging fluids, and first sealing means between each alternate plate and one of the two adjacent intermediate plates defining an elongated passage for flow of one of the heat exchanging fluids from a said port at one end to a said port at the opposite end of said passage, alternate ones of said passage accommodating flow of a first said fluid and the other passages accommodating flow of a second said fluid, said first sealing means also defining a channel interconnecting opposing ports to accommodate flow of the other of said heat exchanging fluids bypassing said passage, each alternate plate an the other of said two adjacent intermediate plates forming a double-wall unit so arranged that an area between the two plates may form a path through which leakage of a said fluid through one of the plates can escape between the plates to the atmosphere, characterized in that each plate of each double wall unit is shaped to the other plate of the unit so that the ridges and valleys of each plate of said unit will conform to and intimately contact the ridges and valleys of the other across the entire area of said passages and the portions around the ports, and that second sealing means in the form of welded or soldered joints interconnect the plates of said double-wall unit at their said contacting portions surrounding each pair of opposing ports to form channels through which both of said fluids can pass separately without entering said area between the plates.

4,976,314
T-SLOT MANDREL AND KICKOVER TOOL

William B. Crawford, 14135 Champions Dr., Apt. 113, Houston, Tex. 77069, and Perry Decuir, Sr., P.O. Box 721, New Iberia, La. 70561-0721

Continuation of Ser. No. 151,654, Feb. 3, 1988, abandoned. This application Jul. 28, 1989, Ser. No. 385,965
Int. Cl.[5] E21B *23/03*
U.S. Cl. 166—117.5 31 Claims





27. Well apparatus comprising: a side pocket mandrel having a main bore and a receptacle laterally offset to the side of said main bore for receiving a flow control device; an orienting sleeve fixed in said mandrel and having guide surfaces leading to a longitudinal slot; channel means in said mandrel adjacent said slot and defining therewith a generally T-shaped, longitudinally extending recess; a kickover tool assembly adapted to pass through said main bore and including a body having a first arm mounted thereon, said first arm having one end pivotally attached to said body and another end movable between an inner position and an outer position with respect to said body; means urging said other end of said first arm toward said outer position; and projecting means on said other end of said first arm arranged to engage said T-shaped, longitudinally extending recess in said mandrel to positively hold said first arm in said outer position and enable a flow control device coupled thereto to be placed in said receptacle.

4,976,315
USE OF TAURINE ADDITIVES IN ENHANCED OIL RECOVERY WITH ANIONIC SURFACTANTS

Gabriel Prukop, and Chhiv K. Chea, both of Houston, Tex., assignors to Texaco Inc., White Plains, N.Y.

Filed Nov. 6, 1989, Ser. No. 432,029
Int. Cl.[5] E21B *43/22*
U.S. Cl. 166—270 11 Claims

1. In a method for recovering petroleum from a subterranean, petroleum-bearing formation penetrated by at least one

injection well and at least one production well, said recovery method being of the type wherein an aqueous fluid comprising anionic surfactant is injected into the formation via the injection well, and oil displaced by the injected fluid is recovered from the formation via the production well, wherein the improvement comprises adding a taurine to said aqueous fluid comprising an anionic surfactant, said taurine having the following formula:

$$X-\underset{\displaystyle R_2}{\overset{\displaystyle R_1}{\underset{|}{\overset{|}{C}}}}-CH_2SO_3^-$$

wherein R_1 is selected from the group comprising hydrogen, a phenyl group, and alkyl groups having from about 1–4 carbon atoms, R_2 is selected from the group comprising hydrogen, a phenyl group, and alkyl groups having from about 1–4 carbon atoms, and X is selected from the group comprising NH_2 and NH_3^+.

4,976,316

METHOD OF ACCELERATING SET OF CEMENT BY WASHOVER FLUID CONTAINING ALKANOLAMINE

Robert B. Carpenter, Hurst, and William N. Wilson, Plano, both of Tex., assignors to Atlantic Richfield Company, Los Angeles, Calif.

Filed Feb. 20, 1990, Ser. No. 481,293
Int. Cl.[5] E21B 33/138, 33/16
U.S. Cl. 166—291 9 Claims

1. A method of treating a well completed into subterranean formations for producing a desired hydrocarbonaceous fluid therefrom which includes the steps of:

setting a packer and squeezing retarded cement into one of open perforations, voids behind the casing and in the formation and any open area of the wellbore, the improvement comprising:

washing over the cement with an overwash comprising a solution of a compatible accelerator selected from the group consisting of triethanolamine, diethanolamine, and monoethanolamine in a concentration sufficient to effect acceleration of the set of the cement slurry compared to the set of the cement slurry without the compatible accelerator.

7. In a method of accelerating the set of cement at the top of liners within the well in which a retarded cement is pumped into the well and allowed to set about top of said liner, improvement comprising:

washing over said cement with a solution of a compatible accelerator selected from the group consisting of triethanolamine, diethanolamine and monoethanolamine in a concentration sufficient to effect acceleration of the set of said cement.

4,976,317

WELL TOOL HYDROSTATIC RELEASE MEANS

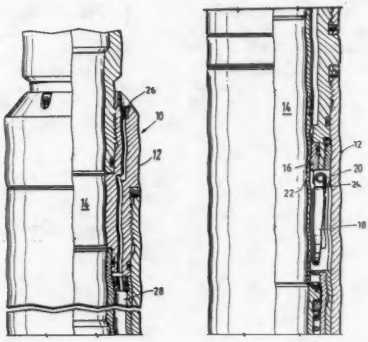
Dwayne D. Leismer, Pearland, Tex., assignor to Camco International Inc., Houston, Tex.

Filed Jul. 31, 1989, Ser. No. 387,206
Int. Cl.[5] E21B 34/10, 43/12
U.S. Cl. 166—321 6 Claims

1. In a well tool having a housing with hydraulic piston and cylinder assembly therein for actuating said tool, said housing including a fluid passageway in communication with the piston and cylinder assembly and adapted to be in communication with control fluid at the well surface, the improvement in means equalizing hydrostatic pressure acting on the assembly comprising,

a valve seat and valve element positioned in the fluid passageway for closing the passageway when the assembly is actuated by control fluid,

a rod having first and second sections, said rod connected to the assembly and movable by the assembly for moving the second section into the valve seat, said second section having a smaller cross-sectional area and smaller length than the cross-sectional area and length of the first section, and



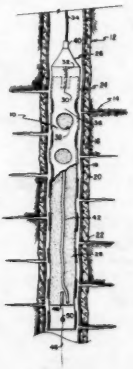
the area through the valve seat being less than the cross-sectional area of the first section but larger than the cross-sectional area of the second section.

4,976,318

TECHNIQUE AND APPARATUS FOR STIMULATING LONG INTERVALS

Henry H. Mohaupt, 1151 Estrella Dr., Santa Barbara, Calif. 93110

Filed Dec. 1, 1989, Ser. No. 444,408
Int. Cl.[5] E21B 37/08, 43/26
U.S. Cl. 166—311 28 Claims



12. A method of cleaning an uncemented slotted liner in a well bore penetrating a subterranean formation, comprising

lowering a running liner having a plurality of openings therein into the slotted liner;

lowering the propellant charge into the running liner after lowering the running liner into the slotted liner;

igniting the propellant charge and producing a quantity of high pressure combustion products;

delivering the combustion products through the openings of the running liner and thereby throttling the pressure of the combustion products; and

delivering the combustion products through the openings of the slotted liner.

27. Apparatus for treating a well penetrating a subterranean formation, comprising

first and second carriers having first and second propellant charges therein for generating a quantity of high pressure gaseous combustion products;

an igniter for initiating combustion of a first of the propellant charges; and

a connector securing the first and second carriers in axial relation and having therein means for transmitting combustion of the first charge to the second charge and reducing the propagation rate of the apparatus including means in the connector responsive to pressure in the first carrier for igniting the second propellant charge.

4,976,319

WATER DRIVEN FAN FOR FIREFIGHTING

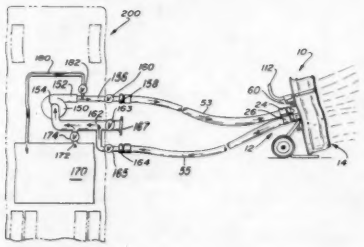
H. Alfred Eberhardt, Paoli, and Richard E. Teske, Norristown, both of Pa., assignors to Hale Fire Pump Company, Conshohocken, Pa.

Filed Mar. 6, 1989, Ser. No. 319,548

The portion of the term of this patent subsequent to Mar. 13, 2007, has been disclaimed.

Int. Cl.[5] A62C 29/00

U.S. Cl. 169—54 24 Claims



1. A water driven fan for use in positive pressure ventilation in the fighting of fires comprising:

a fan and turbine unit including

a fan means including a shaft mounted for rotation, a hub secured to said shaft and a plurality of fan blades mounted on said hub to rotate therewith and to extend radially therefrom,

and a water powered turbine for driving said fan means including a housing having an inlet, a volute and an outlet for directing the water driving said turbine,

said turbine housing defining an inlet chamber for receiving water under pressure delivered from a pressurized source to said turbine inlet and a volute chamber communicating with said inlet chamber,

and a flow control valve means mounted in said turbine housing for controlling the flow of water from said inlet chamber to said volute chamber.

4,976,320

CONCEALED SPRINKLER WITH DROP DOWN DEFLECTOR ASSEMBLY, AND IMPROVED FUSIBLE VALVE LEVER ASSEMBLY

George S. Polan, Harleysville, Pa., assignor to Central Sprinkler Corporation, Lansdale, Pa.

Filed May 25, 1989, Ser. No. 356,740

Int. Cl.[5] A62C 37/08

U.S. Cl. 169—39 12 Claims

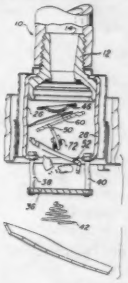
12. A sprinkler with drop down deflector assembly, comprising:

a body having a passage with an inlet and an outlet for conducting flow of pressurized fluid,

a valve assembly for sealing the passage outlet,

a frame connected to the body and having opposed arms, each arm depending from the body and having a free end portion, the arm free end portions being separated by a gap so that the arms are not subjected to assembly loads or system pressure loads,

a drop down deflector assembly mounted on said free end portions of said arms so as to be displaceable from a first elevation to a second, lower elevation, said valve assembly including an upper lever and a lower lever each pivotably mounted at an end portion thereof to the body, a valve supported by said upper lever, the upper lever being supported along another end portion thereof by the lower lever such that upward pivoting movement of said lower lever causes upward pivoting movement of said upper lever against the valve, said upper and lower levers having jaws for holding a rigid thermal responsive element therebetween, said jaws being expandable upon upward pivoting movement of said lower lever, and means for adjusting compressive pre-load on said valve against the valve seat by expanding said jaws to cause said upper lever to pivot upwardly against the valve.



4,976,321

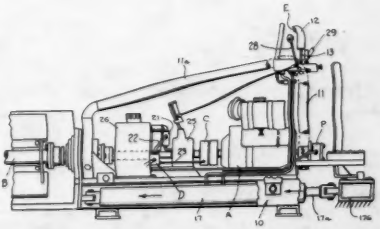
HORIZONTAL EARTH BORING MACHINE AND METHOD

Brad Van Meter, Greenville, S.C., assignor to McLaughlin Manufacturing Company, Inc., Greenville, S.C.

Filed Mar. 29, 1989, Ser. No. 331,656

Int. Cl.[5] E21B 3/02, 44/00

U.S. Cl. 175—24 8 Claims



1. In a horizontal earth boring machine having an engine, a transmission containing transmission gears, and a boring apparatus including a drill string driven by said engine through said transmission located between said engine and said drill string the improvement comprising:

a hydraulic clutch driven by said engine for driving said transmission;

a solenoid operated valve for supplying hydraulic fluid for operating said clutch; and

a manually operated trigger for providing switching to open said valve for supplying hydraulic fluid to said hydraulic clutch so long as said trigger is manually actuated and said engine is running;

whereby a torque resulting from an obstacle such as a rock and transmitted from said drill string through said hydraulic clutch interrupts manual operation of the trigger thereby cutting off switching to said solenoid operated valve and, consequently, disabling operation of the hydraulic clutch releasing momentum of the engine fast enough to avoid injury or damage.

4,976,322

METHOD OF CONSTRUCTION OF MULTIPLE-STRING WELLS

Gabrashit S. Abdrakhmanov, ulitsa Gogolya, 66, kv. 71; Albert G. Zainullin, ulitsa Saidasheva, 1, kv. 117; Filipp G. Arzamasstsev, ulitsa Gafiatullina, 36, kv. 37, all of Bugulma; Rashid A. Uteshev, ulitsa Nagornaya, 23, korpus 2, kv. 31, Moscow; Rustam K. Ibat Ullin, ulitsa Gogolya, 66, kv. 49; Izil G. Jusupov, ulitsa Tukaya, 73a, kv. 18, both of Bugulma; Anatoly V. Perov, Varshavskoe shosse, 143, korpus 1, kv. 89, Moscow; Midkhat R. Mavljutov, ulitsa Bljukhera, 18, kv. 20, Ufa; Rashit K. Sannikov, ulitsa Mayakovskogo, 16, kv. 83, Ufa; Vil F. Galiakbarov, ulitsa Dmitrieva, 19, kv. 16, Ufa, and Ilyas A. Urazgildin, ulitsa Gafiatullina, 16, kv.70, Bugulma, all of U.S.S.R.

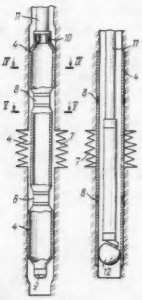
PCT No. PCT/SU88/00234, § 371 Date Sep. 20, 1989, § 102(e) Date Sep. 20, 1989, PCT Pub. No. WO89/06739, PCT Pub. Date Jul. 27, 1989

PCT Filed Nov. 22, 1988, Ser. No. 423,418

Claims priority, application U.S.S.R., Jan. 21, 1988, 4366623

Int. Cl.[5] E21B *33/13*

U.S. Cl. 175—57 **2 Claims**



1. A method of well construction, comprising the steps of:

drilling a well in rock;

consolidating said well with a surface casing string and a conductor casing string;

further drilling said well to a specified depth with a bit of one diameter, so that said well has a constant diameter from said conductor casing string to said specified depth;

expanding the diameter of said well at troublesome zones exposed in said well;

isolating said troublesome zones, as they are exposed, with profile pipes having an outer diameter prior to profiling which is less than said expanded diameter of said troublesome zones by setting said profile pipes at said troublesome zones, radially expanding said profile pipes by creating a pressure differential therein, and further expanding said profile pipes so that said outer diameter of said profile pipes equals said expanded diameter of said troublesome zones, and so that an inner diameter of said profile pipes is equal to said constant diameter of said well;

descending and securely fastening a flow string into said well to said specified depth.

4,976,323

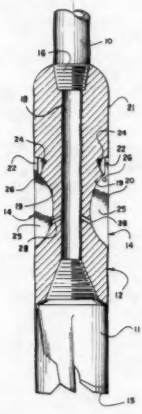
COUNTERBORING DEVICE FOR WELLS

Richard A. Kitchens, 1617 S. Highway 85, Fayetteville, Ga. 30214

Filed Jun. 30, 1989, Ser. No. 373,405

Int. Cl.[5] E21B *10/32*

U.S. Cl. 175—267 **3 Claims**



1. In a drilling apparatus for drilling monitoring wells, wherein said drilling apparatus includes a drill bit, a drill rod for carrying and for rotating said drill bit, and a drill extension for connecting said drill rod to said drill bit, said drill rod defining a coolant passage therethrough, said drill extension defining a central passageway in communication with said coolant passage, the improvement wherein said drill extension includes at least one cutting device, said cutting device including a body pivotally carried by said drill extension, said drill extension defining at least one cavity therein for selectively receiving said body freely pivoted therein between a fully contracted and a fully extended position, said cavity having a size and shape just to receive said body, said drill extension further defining a passage between said central passageway and said cavity, and means for limiting the outward movement of said body to define the fully extended position, the arrangement being such that said cavity normally receives said body, and said body is pivoted outwardly therefrom to a cutting position by centrifugal force on rotation of said drill extension by said drill rod, and some of the coolant flowing through said coolant passage and into said central passageway is divered through said passage between said central passageway and said cavity for assisting in causing outward pivotal motion of said body.

4,976,324

DRILL BIT HAVING DIAMOND FILM CUTTING SURFACE

Gordon A. Tibbitts, Salt Lake City, Utah, assignor to Baker Hughes Incorporated, Houston, Tex.

Filed Sep. 22, 1989, Ser. No. 411,419

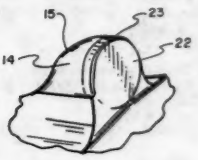
Int. Cl.[5] E21B *10/46, 10/52*

U.S. Cl. 175—329 **24 Claims**

1. A drill bit for earth boring, comprising:

a body member; and

a plurality of cutting members disposed on and protruding from the surface of said body member, said cutting mem-



bers including diamond cutting faces comprising a diamond substrate coated with a diamond film.

4,976,325

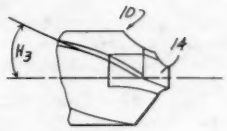
FLUTED CUTTING TOOL AND METHOD OF PRODUCING SAME

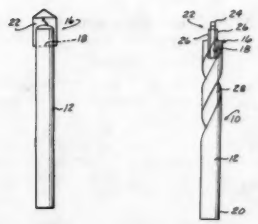
Carl Garbarino, Sterling Heights, Mich., assignor to Carolina Twist Drill, Inc., Warren, Mich.

Filed Jun. 2, 1989, Ser. No. 360,318

Int. Cl.[5] E21B *10/44*

U.S. Cl. 175—394 **10 Claims**





1. A method of producing a carbide-tipped drill bit comprising the steps of:

cutting and heat treating steel rod stock to a predetermined length and hardness;

forming an axially inwardly extending, open ended transverse slot extending diametrically across a first end of said rod;

inserting a carbide tip assembly, comprising a plate-like carbide tip element having longitudinally extending sides and shims placed in face-to-face engagement with said sides of said tip element in a sandwich-like configuration, into said slot in said rod, such that a portion of said carbide tip element extends longitudinally beyond said first end of said rod when fully engaged within said slot;

brazing said carbide tip assembly into position in said slot;

grinding said rod to a predetermined drill bit diameter after brazing said carbide tip element in position;

aligning said rod relative to a grinding apparatus with said portion of said carbide tip element aligned in a predetermined radial position relative to a vitrified grinding wheel of said grinding apparatus; and

grinding flutes, of a predetermined configuration, through the external surface of said carbide tip assembly and said rod in a single machine operation with said vitrified grinding wheel of said grinding apparatus.

4,976,326

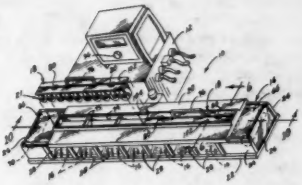
WEIGHING SYSTEM

Bain C. McConnell; William R. Jarvis, both of Winston-Salem; C. Fred Demey, III, Belews Creek, and James G. Maddrey, Jr., Walkertown, all of N.C., assignors to R. J. Reynolds Tobacco Company, Winston-Salem, N.C.

Filed Dec. 22, 1989, Ser. No. 455,045

Int. Cl.[5] G01G *19/00*

U.S. Cl. 177—145 **30 Claims**



1. Apparatus for weighing Cambridge units used in cigarette testing and each having a generally disc-like main body and tubular stems projecting outwardly from opposite sides of said body, comprising:

an elongate housing;

an array of weighing devices mounted within and extending longitudinally of said housing;

transporting means for supporting a group of said units within said housing and for transporting said units in unison with each other longitudinally of said array of weighing devices between different locations in each of which different ones of said units are supportively engaged and weighed by said weighing devices.

4,976,327

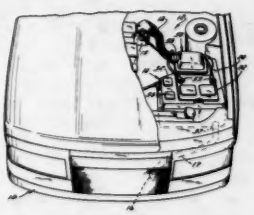
BATTERY MODULE FOR THE ENGINE COMPARTMENT OF AN AUTOMOBILE

David N. Abujudom, II, Brookfield; Thomas J. Dougherty, Waukesha; Mark S. Inkmann, Milwaukee; Richard T. Johnson, Hubertus; Neil C. Karolek, and David W. Saari, both of South Milwaukee, all of Wis., assignors to Globe-Union Inc., Milwaukee, Wis.

Filed Feb. 14, 1989, Ser. No. 311,149

Int. Cl.[5] B60K *11/00, 13/02;* B60R *16/04*

U.S. Cl. 180—68.2 **18 Claims**



1. In a front section of a motor vehicle having an engine compartment enclosed by a hood, an engine having an air inlet

mounted in the compartment, a battery module mounted in the engine compartment, said module comprising:

a housing for enclosing a battery within the engine compartment separately from the engine,

said housing including an air inlet, an air outlet and a battery compartment,

said air outlet being connected to the air inlet to the engine,

a first air flow path through said housing between said air inlet and said air outlet,

a second air flow path between said air inlet and said air outlet around the outside of said battery compartment,

and temperature responsive means in said first air flow path including a shape memory alloy member and a damper for diverting air from said first air flow path to said second air path when the ambient air temperature exceeds a predetermined temperature.

4,976,328

REAR WHEEL TURNING SYSTEM

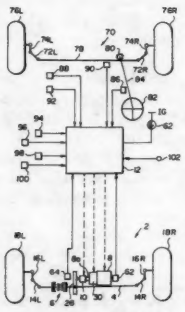
Hiroshi Ohmura, Hiroshima, Japan, assignor to Mazda Motor Corporation, Hiroshima, Japan

Filed Apr. 6, 1989, Ser. No. 334,191

Claims priority, application Japan, Apr. 11, 1988, 63-88457; Apr. 15, 1988, 63-93076; Apr. 22, 1988, 63-99746

Int. Cl.[5] B62D *5/04*

U.S. Cl. 180—140 **36 Claims**



1. A rear wheel turning system comprising a rear wheel turning means which is connected to the rear wheels of the vehicle and is adapted to be displaced so as to turn the rear wheels, an electric motor which is operatively connected to the rear wheel turning means and the steering wheel so as to displace the rear wheel turning means, which turns the rear wheels in response to the operation of the steering wheel, a rear-wheel-neutralizing means which urges the rear wheel turning means to the neutral position in which the rear wheels are held in the straight-ahead position, a clutch means which is interposed between the electric motor and the rear wheel turning means and is adapted to disconnect the latter from the former to permit the latter to return to the neutral position under the force of the rear-wheel-neutralizing means, and a returning speed limiting means which lowers the returning speed at which the rear wheel turning means returns to the neutral position,

wherein said returning speed limiting means lowers said returning speed by controlling said clutch means, and said returning speed limiting means lowers the returning speed by repeatedly alternating between disengaging and engaging the clutch.

4,976,329

WHEEL ACCELERATION SLIP CONTROL APPARATUS IN A VEHICLE BRAKE SYSTEM

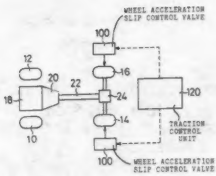
Kiyotaka Ise, Susono, Japan, assignor to Toyota Jidosha Kabushiki Kaisha, Aichi, Japan

Filed Sep. 12, 1989, Ser. No. 406,362

Claims priority, application Japan, Sep. 30, 1988, 63-248722

Int. Cl.[5] B60K *28/16*

U.S. Cl. 180—197 **10 Claims**



1. A wheel acceleration slip control apparatus for a vehicle, for applying brakes to right and left drive wheels of the vehicle upon detection of an excessive slip of the drive wheels, comprising:

a right and a left wheel brake for applying brake to said right and left drive wheels, independently of each other;

slip detecting means for detecting slipping conditions of said right and left drive wheels, upon acceleration of said drive wheels;

target determining means for determining a first and a second control target for controlling said right and left wheel brakes so as to reduce degrees of slip of said right and left drive wheels, respectively, depending upon the slipping conditions of said right and left drive wheels detected by said slip detecting means, respectively;

brake control means for operating said right and left wheel brakes according to said first and second control targets determined by said target determining means, respectively; and

said target determining means determining said first and second control targets, each based on nominal control targets which correspond to the slipping conditions of the right and left drive wheels detected by said slip detecting means, said target determining means determining one of said first and second control targets for one of the drive wheels which has a low slipping tendency, such that said nominal control target of said one drive wheel is changed to a final control target which is closer to the nominal control target of the other drive wheel so that a first difference between said final control target of said one drive wheel and said nominal control target of said other drive wheel is not smaller than a predetermined amount, in a first case where a second difference between said nominal control target of said one drive wheel and said nominal control target of said other drive wheel exceeds said predetermined amount,

said target determining means determining, in a second case where said second difference is equal to or smaller than said predetermined amount, said one of the first and second control targets such that said first difference is smaller than that in said first case,

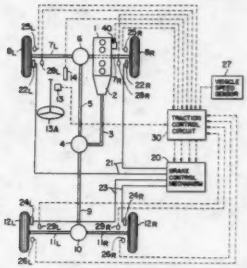
said target determining means using said final control target of said one drive wheel and said nominal control target of said other drive wheel as said one and the other of said first and second control targets.

4,976,330

VEHICLE TRACTION CONTROL SYSTEM FOR PREVENTING VEHICLE TURNOVER ON CURVES AND TURNS

Renpei Matsumoto, Tokyo, Japan, assignor to Fuji Jukogyo Kabushiki Kaisha, Tokyo, Japan

Filed Dec. 6, 1988, Ser. No. 280,437
Claims priority, application Japan, Dec. 22, 1987, 62-326083
Int. Cl.[5] B60K *31/00*; B60T *8/18*
U.S. Cl. 180—197 4 Claims



1. A traction control system for a motor vehicle having engine with a throttle valve actuated by an actuator means and wheels driven by the engine, accelerator pedal depression degree detector means for detecting degree of acceleration pedal depression and for producing a depression degree signal, throttle control means responsive to the depression degree signal for computing a desired throttle valve opening degree corresponding to the accelerator pedal depression degree and for producing a desired opening degree signal to the actuator means, the traction control system comprising:

wheel stroke detecting means for detecting wheel stroke depending on a vertical movement of each of the wheels and for producing a wheel stroke signal;

wheel lift-off detector means responsive to said wheel stroke signal for determining a wheel lift-off condition when said wheel stroke of either of the wheels exceeds a predetermined value and for producing a wheel life-off signal; and

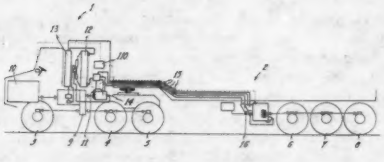
correction means responsive to said wheel lift-off signal and to the desired opening degree signal for decreasing the desired throttle valve opening degree to reduce an output of the engine.

4,976,331

PROCESS AND DEVICE FOR CONTROLLING THE DRIVING TORQUE TRANSMITTED BY A TRACTOR TO A HYDRAULICALLY POWERED TRAILER

Willy J. Noerens, 396 Chaussee de Bruxelles, B-7498 Braine-Le-Comte, Belgium

Filed Apr. 11, 1989, Ser. No. 336,056
Claims priority, application Belgium, Apr. 12, 1988, 88/00409
Int. Cl.[5] B62D *59/04*
U.S. Cl. 180—197 12 Claims



1. Process for controlling the torque transmitted to the trailer of a tractor-trailer vehicle, in which the motor of the tractor drives on one hand the driving wheels of the tractor, through a gear box, and on the other hand, through a power take-off, a hydraulic pump feeding, via a hydraulic circuit, at least one hydraulic motor on the trailer, said hydraulic motor driving the driving wheels of the trailer, the rotating speed of the pump being bound to the rotational speed of the wheels of the tractor, and the rotational speed of the motor being bound to the rotational speed of the wheels of the trailer, said process comprising the steps of:

establishing, in the hydraulic circuit interconnecting the hydraulic motor and the hydraulic pump, between the input and the output of at least one of the hydraulic motor and the hydraulic pump machines, a by-pass circuit adapted to allow a slipping between the speed of the hydraulic motor and the speed of the hydraulic pump,

generating in the by-pass circuit a pressure loss such that a variation of the speed slipping, resulting in a variation of the flow through said by-pass circuit, produces a perceptible pressure difference in the pressure side of the hydraulic circuit,

determining the slipping between the rotational speed V_m of the hydraulic motor and the speed V_p of the hydraulic pump, in relation to a reference value, and simultaneously

checking the pressure in the pressure side of the hydraulic circuit and, when said pressure goes outside a predetermined interval,

acting on the capacity of at least one of the hydraulic pump or hydraulic motor machines to bring the slipping back to zero.

4,976,332

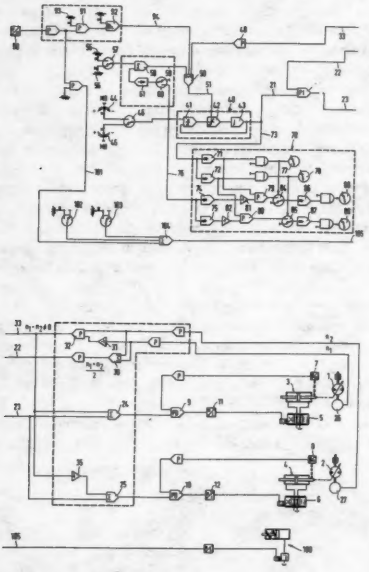
CIRCUIT ARRANGEMENT FOR THE DRIVE OF A VEHICLE

Theo Hein, Lohr/Main, Fed. Rep. of Germany, assignor to Mannesmann Rexroth GmbH, Lohr/Main, Fed. Rep. of Germany

Filed Aug. 16, 1988, Ser. No. 232,716
Claims priority, application Fed. Rep. of Germany, Aug. 19, 1987, 3727690
Int. Cl.[5] B60K *17/34*
U.S. Cl. 180—197 24 Claims

1. A control circuit arrangement for the drive of a vehicle having at least two axles, a driven axle and a second axle, the control circuit arrangement comprising a hydrostatic machine coupled to the driven axle with adjustable absorption and displacement volumes in both directions of rotation for driving said driven axle in forward or reverse directions and for braking said driven axle in either direction of rotation, said hydrostatic machine being connected to a pressure network with impressed pressure, a valve means for operating an adjustment means of said hydrostatic machine for adjusting its absorption and displacement volume, a speed control circuit responsive to a speed desired value and a speed actual value signal for generating an error signal for driving said valve means, a means for providing the speed actual value signal from the speed of said driven axle to the speed control circuit, a means for providing a difference signal from the difference formed between the speed actual value signal and a signal corresponding to the

speed of the second axle of the vehicle, a means for comparing said difference signal with said error signal, and a means for



reducing the torque of the drive in response to a comparison of said difference signal and said error signal.

4,976,333

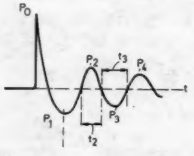
METHOD FOR RESHAPING ACOUSTICAL PRESSURE PULSES

Adrien P. Pascouet, 8925 Lipan, Houston, Tex. 77063

Continuation-in-part of Ser. No. 162,743, Mar. 1, 1988, Pat. No. 4,921,068. This application May 17, 1989, Ser. No. 352,975

Int. Cl.[5] G01V *1/04*

U.S. Cl. 181—115 **10 Claims**



1. A method of reshaping a cuspate waveform ordinarily characteristic od secondary pulses resultant from an explosive underwater release of a first charge of highly pressurized gas having an energy E_a where said first charge produces in said water a primary pressure pulse and a very low pressure region tending to oscillate at a period T, said method comprising the steps of:

injecting within said low pressure region a second charge of pressurized gas having an energy E_b, where E_b is at least equal to about E_a; and

tuning the duration of the injection and the time the injection starts so as to produce a secondary pulse having a quasi-harmonic waveform.

4,976,334

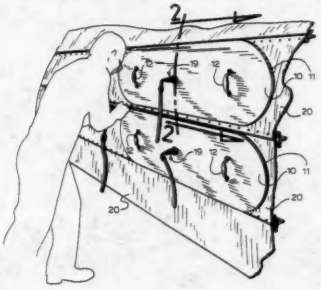
NOISE REDUCING TOOL AND METHOD

Gary E. Brooks, New Glasgow, Canada, assignor to Bombardier, Inc., Montreal, Canada

Filed Dec. 5, 1989, Ser. No. 446,057

Int. Cl.[5] F16F *15/00*

U.S. Cl. 181—207 **17 Claims**



1. A vacuum noise reducing tool to attenuate vibrations in a panel or sheet while performing work thereon, comprising:

a substantially flexible vibration damping pad, defining an inward face and an outward face,

peripheral air seal means provided around the vibration damping pad, projecting from and forming a closed boundary around the inward face of the vibration damping pad, and

vacuum outlet means outwardly extending through the vibration damping pad with the vibration damping pad being constructed and arranged whereby application of vacuum to the vacuum outlet produces a vacuum against the inward face inside the boundary thereof and forces engagement of the vibration damping pad against the panel or sheet thereby operatively damping vibrations produced upon working on the sheet material.

4,976,335

SYSTEM FOR LUBRICATING MECHANICAL MEMBERS, IN PARTICULAR AIRCRAFT COMPONENTS, FEATURING A MINIMUM EMERGENCY OIL SUPPLY DEVICE

Bruno Cappellato, Turin, Italy, assignor to Fiat Aviazione S.p.A., Italy

Filed Feb. 13, 1990, Ser. No. 478,635

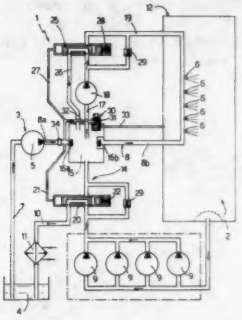
Claims priority, application Italy, Feb. 14, 1989, 67088 A/89

Int. Cl.[5] F01M *1/18*

U.S. Cl. 184—6.4 **12 Claims**

1. A system for lubricating mechanical members, particularly aircraft drive components, said system presenting a main circuit comprising a main tank containing lubricating oil, at least a main pump connected to said main tank, supply means for supplying said lubricating oil to said members, at least a delivery pipe connecting said pump to said supply means, means for recovering said lubricating oil subsequent to lubrication of said members, and recirculating means for recirculating said oil to said main tank; and an emergency device for ensuring at least a minimum supply of lubricating oil to at least some of said supply means in the event of a breakdown on said main circuit; characterised by the fact that said emergency device **(14)** comprises a storage tank **(15)** series-connected to said delivery pipe **(8)**; intercepting means **(16*a*, 16*b*)** for intercepting oil flow along said delivery pipe **(8)** to and from said storage tank **(15)**; at least an auxiliary pump **(18)** connected to said storage tank **(15)**; an auxiliary delivery pipe **(19)** for connecting

said auxiliary pump (18) to said supply means (6; 6b; 6d); and first distributing means (20) for selectively connecting said



recovery means (9) to said recirculating means (10) to said main tank (4), or to said storage tank (15).

4,976,336

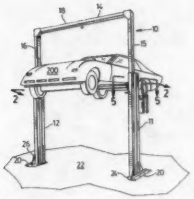
LIFTING APPARATUS AND LIFTING ARM ASSEMBLY FOR USE THEREIN

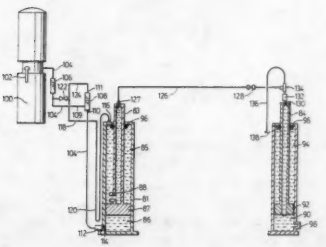
Robert J. Curran, Mississauga, Canada, assignor to Derlan Manufacturing Inc., Mississauga, Canada

Filed Sep. 13, 1988, Ser. No. 243,861

Int. Cl.[5] B66F *7/04*

U.S. Cl. 187—8.5 **19 Claims**





1. A lifting apparatus for lifting loads, the lifting apparatus comprising: first and second posts for mounting on the ground; first and second carriages slidably mounted on the posts for generally vertical movement; a lifting member extending between and joined to the first and second carriages so as to travel up and down with the carriages; first and second load support means mounted on the first and second carriages beneath the lifting member for supporting a load beneath the lifting member; an hydraulic power unit; a first hydraulic actuator which is a master actuator and comprises a first cylinder, a first piston separating two first chambers from one another within the first cylinder, a cylinder port opening into one first chamber, a first hollow piston rod secured at one end to the first piston and extending through said other first chamber and out from the first cylinder and including at said on end an opening into the other first chamber and a first piston rod port at the other end thereof, wherein one of the first cylinder and the first piston rod is secured to the first post with the hydraulic power unit connected to respective one of the cylinder port and the first piston rod port, and the other of the first cylinder and the first piston rod is secured to the first carriage, and a connection line is provided secured to the lifting member and connected to the other cylinder port and the first piston rod port; and a second hydraulic actuator which is a slave actuator and comprises a second cylinder, a second piston in the second cylinder separating two second chambers from one another, a second piston rod, with an hydraulic connection being provided between the connection line and one second chamber, and with the second chambers sized so that the first and second carriages are displaced at substantially equal rates in the same direction.

4,976,337

PROXIMITY DETECTION SYSTEMS

John Trett, Marlow, United Kingdom, assignor to Formula Systems Limited, Oxford, England

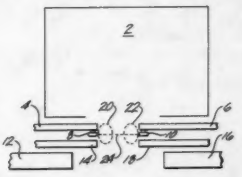
PCT No. PCT/GB88/00451, § 371 Date Feb. 8, 1989, § 102(e) Date Feb. 8, 1989, PCT Pub. No. WO88/09862, PCT Pub. Date Dec. 15, 1988

PCT Filed Jun. 10, 1988, Ser. No. 312,707

Claims priority, application United Kingdom, Jun. 11, 1987, 8713654

Int. Cl.[5] B66B *13/00*

U.S. Cl. 187—51 **9 Claims**



1. A proximity detection system comprising a detection strip mountable adjacent a leading edge of a door, a capacitive detector mounted within the detection strip which monitors a columnar-like zone extending parallel to the strip and located immediately in front of the leading edge of the door, and an optical detector mounted within the same detection strip which monitors a planar zone intersecting the columnar-like zone and extending across any opening defined between the leading edge of the door and an opposing edge of the opening.

4,976,338

LEVELING CONTROL SYSTEM FOR HYDRAULIC ELEVATOR

Gordon A. Holland, DeSoto County, Miss., assignor to Delaware Capital Formation, Inc., Wilmington, Del.

Filed Apr. 27, 1989, Ser. No. 344,319

Int. Cl.[5] B66B *1/04*

U.S. Cl. 187—110 **14 Claims**

1. A hydraulic elevator system comprising:

a car;

a plurality of landings;

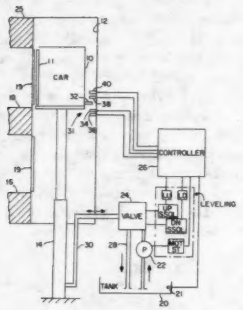
jack means for raising and lowering the car between landings;

pump means for supplying pressurized hydraulic fluid;

a hydraulic valve for selectively directing fluid from said pump means to said jack means for raising said car;

level up sensing means for detecting car position at a plurality of selected releveling distances below floor level position; and

processor control means (a) for changing releveling distance



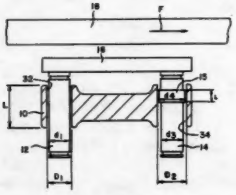
responsive to at least one elevator operating parameter; (b) for selecting an effective hysteresis value as a function at least of releveling distance; (c) for actuating said pump means responsive to the actuation of said level up sensing means; and (d) for actuating said hydraulic valve responsive to the actuation of said level up sensing means for a distance dependent upon said effective hysteresis value.

4,976,339

DISC BRAKE AND SUPPORT SYSTEM FOR SUCH A BRAKE

Claude Le Marchand, Domont, France, assignor to Bendix France, Drancy, France

Filed May 17, 1989, Ser. No. 353,848
Int. Cl.[5] F16D *65/06*
U.S. Cl. 188—73.45 **8 Claims**



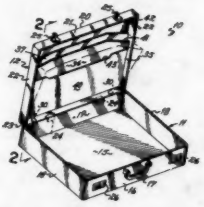
1. A disc brake for a motor vehicle, comprising a torque-supporting member with which is associated actuation means capable of urging at least one friction element against a rotating disc, said torque-supporting member being equipped with a first bore located at the torque input and with a second bore located at the torque output allowing the member to slide respectively on a first column located at the torque input and on a second column located at the torque output in a direction substantially perpendicular to a plane of the rotating disc, the columns being fixed to a stationary support, characterized in that guide lengths of the torque-supporting member on the first column and on the second column are different, and in that play left between the first column and the first bore and between the second column and the second bore are different, wherein the guide length of the torque-supporting member on the first column is greater than the guide length of the torque-supporting member on the second column.

4,976,340

FILE FOLDER FOR ATTACHE CASE

David Bieber, East Greenwich, and Lester E. Carpenter, Middletown, both of R.I., assignors to American Tourister, Inc., Warren, R.I.

Filed Feb. 6, 1990, Ser. No. 475,751
Int. Cl.[5] A45C *3/02, 13/00*
U.S. Cl. 190—109 **7 Claims**



3. An attache case comprising:

a generally rectangular container,

a lid having a top wall and depending front, rear and side walls, said rear wall being hinged to said rectangular container,

a file folder having a rear divider having side edges connected to said top wall of said lid by flexible webs, and a front divider having side edges connected to said rear divider by flexible webs,

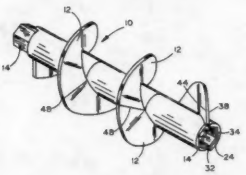
a U-shaped wire spring having ends fixed to said lid rear wall, said spring having a bight portion fixed to said front divider on the surface facing said rear divider.

4,976,341

SEGMENTED AUGER

Vance G. Lundell, R.R. 1, Box 27, Odebolt, Iowa 51458

Continuation of Ser. No. 6,564, Jan. 22, 1987, abandoned. This application Aug. 22, 1988, Ser. No. 236,263
Int. Cl.[5] B65G *33/32*
U.S. Cl. 198—666 **11 Claims**



1. A segmented auger comprising:

a. a plurality of auger segments including

i. a central longitudinal hollow hub,

ii. a longitudinal extension at each end of said hub,

iii. helical flighting on said hub extending from said extension at one end of said hub to the extension at the other end of said hub,

iv. beveled end portions on ends of said helical flighting each portion including a radial edge at an obtuse angle and a radial edge at an acute angle supplementary to said obtuse angle wherein said beveled end portion tapers from said obtuse edge to said acute edge, and

v. whereby said beveled end portion twists relative to the longitudinal axis of said hub from being substantially aligned with the longitudinal axis near said hub to being at an increasing angle to the longitudinal axis at an increasing distance from said hub; and

b. a drive shaft about which said plurality of said auger

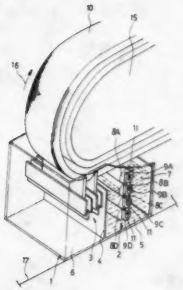
segments are assembled end-to-end to provide a substantially smooth and continuous helical flighting surface.

4,976,342

CLEANING DEVICE FOR ARMREST BELT OF THE ESCALATOR

Feng-Lin Hwang, No. 21, Pa Te Road, Chi Tu District, Keelung City, Taiwan

Filed Nov. 30, 1989, Ser. No. 443,735
Int. Cl.[5] B65G *45/00*
U.S. Cl. 198—495 **9 Claims**



1. A device for cleaning an armrest belt of an escalator without interfering with the normal operation of the escalator, the device comprising:

a container which includes a front area, a rear area and a partition for separating the front area and the rear area;

a roller which is in contact with the surface of the armrest belt such that movement of the armrest belt causes the roller to rotate, the roller being formed of an absorbent material so as to absorb cleaning liquid from the front area of the container and so as to apply cleaning liquid to the surface of the armrest belt when rotated by the armrest belt; and

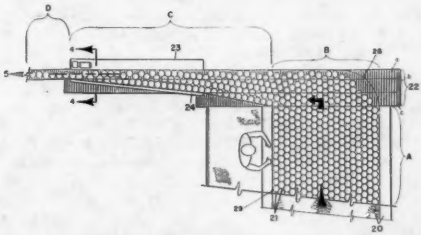
means for removing cleaning liquid from the armrest belt, the removing means being associated with the rear area of the container.

4,976,343

ORDERING APPARATUS HAVING WALLS WITH POLYGONAL ROTATORS

Stuart C. Fuller, Rte. 2, P.O. Box 55, Goode, Va. 24556

Filed Sep. 22, 1989, Ser. No. 411,277
Int. Cl.[5] B65G *47/12*
U.S. Cl. 198—453 **27 Claims**



1. Apparatus for ordering a flow of randomly arranged cylindrical articles into a single file, comprising, in combination,

(1) conveyor means having a conveyor surface composed of at least article single file and article accumulation portions;

(2) restraining walls along at least one side of the article accumulation portion defining

(a) an article accumulation area where the articles are randomly disposed and susceptible to jamming or blockages; and

(b) guide walls leading from the article accumulation area to the article single file portion of the conveyor surface, the guide walls comprising:

(i) a plurality of polygonal rotators;

(ii) arranged for rotation in substantially vertical stands of superimposed rotators;

(iii) the rotators having substantially straight side walls joined together at corners with angles between about 60° and about 150° and so oriented to each other in the stand that corners of some rotators project outwardly beyond side walls of other rotators in the stand for operative contact with cylindrical articles on the conveyor surface

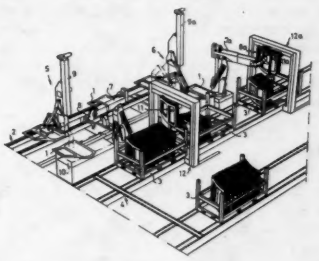
whereby rotating polygonal rotators in the stands upon contact with cylindrical articles impart a vibrational movement to the articles while the articles are rotating and so inhibit jamming and blockages while the articles are moved and ordered into the single file.

4,976,344

METHOD FOR TRANSFERRING ARTICLES

Jimmy Hultberg, Ryd, Sweden, assignor to AB Volvo, Gothenburg, Sweden

Filed Jun. 30, 1987, Ser. No. 68,225
Claims priority, application Sweden, Jul. 10, 1986, 8603081
Int. Cl.[5] B65G *47/30*
U.S. Cl. 198—418.2 **2 Claims**

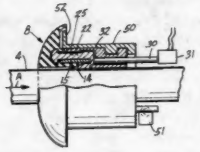


1. In a method of assembling in a rack a plurality of identical articles, comprising positioning said articles in a series that extends lengthwise on an elongated conveyor that moves in the direction of its length, positioning along said conveyor a plurality of article transfer stations, positioning adjacent each article transfer station a rack for the storage of a plurality of said articles, transferring, in each article transfer station, articles from said conveyor to said rack, the number of articles transferred in each article transfer station being equal to the number of articles conveyed divided by the number of article transfer stations, said articles having a length and width substantially greater than their thickness, placing said articles horizontally on said conveyor, and transferring ring said articles in said article transfer stations into upright side-by-side position in said rack; the improvement comprising collecting in each transfer station a group of said articles in upright side-by-side position, transferring said group of said articles into said rack while maintaining said articles in upright side-by-side position, and placing a plurality of said groups in said rack in each said transfer station.

4,976,345
ESCALATOR HANDRAIL OBSTRUCTION DEVICE WITH SENSORS

Willy Adrian, Obernkirchen, and Detlev B. Moldenhaur, Stadthagen, both of Fed. Rep. of Germany, assignors to Otis Elevator Company, Farmington, Conn.

Filed Sep. 29, 1989, Ser. No. 414,865
The portion of the term of this patent subsequent to May 15, 2007, has been disclaimed.
Int. Cl.[5] B66B 29/04
U.S. Cl. 198—323 4 Claims



1. An escalator safety assembly for use at the reentry housing of a moving handrail on the escalator, said safety assembly comprising:

(a) a deformable resilient bumper member for mounting on the reentry housing, said bumper member being configured to surround the handrail and project from the reentry housing in a direction counter to the direction of movement of the handrail;

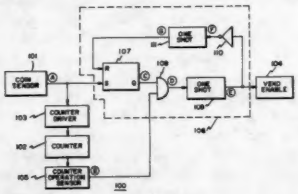
(b) an escalator control switch for mounting in the reentry housing, said switch being operable upon actuation to initiate a shut-off signal to stop the escalator and stop movement of the handrail; and

(c) actuating means movably mounted between said bumper member and said switch, said actuating means being connected to said bumper member and normally held out of engagement with said switch by reason of the resiliency of said bumper member, and said actuating means being operable to contact and actuate said switch in response to sufficient deformation of said bumper member toward the reentry housing upon engagement between said bumper member and an object on the handrail.

4,976,346
COIN COUNTER SECURITY CIRCUIT

Scott Juds, Everett, Wash.; Johnny H. Halsey, and James H. Halsey, both of ElDorado, Ark., assignors to IDX, Inc., El Dorado, Ark.

Filed Jan. 19, 1989, Ser. No. 299,184
Int. Cl.[5] G07F 9/02
U.S. Cl. 194—200 8 Claims



4. A coin counter security device for use with a vending machine having a coin sensor, an accumulated vend counter for counting the number of vending transactions, and vend enable means for enabling a vending transaction, comprising:

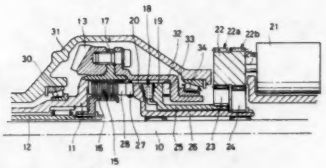
(A) counter operation sense means for detecting when said accumulated vend counter has been active;

(B) logic means responsive to said counter operation sense means and said coin sensor for providing a signal when said accumulated vend counter has been active in conjunction with a detection of proper coinage by said coin sensor, which signal is provided to said vend enable means to allow said vending transaction to continue.

4,976,347
ACTUATOR FOR FRICTION ENGAGEMENT DEVICE

Shiro Sakakibara, and Takaharu Fukaya, both of Anjo, Japan, assignors to Aisin Aw Co., Ltd., Anjo, Japan

Filed Dec. 8, 1988, Ser. No. 281,353
Claims priority, application Japan, Dec. 10, 1987, 62-313896
Int. Cl.[5] F16D 27/00, 43/04; B60K 17/35
U.S. Cl. 192—20 9 Claims



1. An actuator for a friction engagement device adapted for distributing torque to front and rear wheels of a four-wheel drive vehicle, which comprises:

a clutch connected between said front wheel and the rear wheel for controlling distribution of torque to said front and rear wheels,

a fixed case enclosing said clutch,

a torque generating mechanism gear having an electric motor immovably installed on an outer portion of said case, first and second gears coupled with an output shaft of said motor, and third and fourth gears respectively engaging said first and second gears for respectively providing a first and a second pair of gears, said first and second pair of gears having slightly different gear ratios for providing different torques,

a torque-thrust force conversion means for converting a torque difference between two elements respectively connected with said third and fourth gears to a thrust force,

a piston means for pressing said clutch in response to said thrust force output from said torque-thrust force conversion means, and

a thrust bearing installed between said torque-thrust force conversion means and said piston means,

wherein when said motor is activated, said clutch smoothly operates and controls said distribution of torque to said front and rear wheels.

4,976,348
COASTER BRAKE BICYCLE AND CHANGEABLE SPEED GEAR ATTACHMENT THEREFORE

Harry E. Berry, 3510 SW. 32nd Ave., Hollywood, Fla. 33023

Filed May 26, 1989, Ser. No. 357,767
Int. Cl.[5] B62M 9/00
U.S. Cl. 192—6 A 10 Claims

1. In a bicycle having a standard coaster brake and chain transmission the improvement comprising:

a changeable speed transmission attachment mounted in housing means for protecting and housing said attachment;

said housing means being mounted between upper and lower

frame members having an apex at which the rear wheel of the bicycle is mounted;

first gear means in said changeable speed transmission for interconnection with the transmission of a standard bicycle;

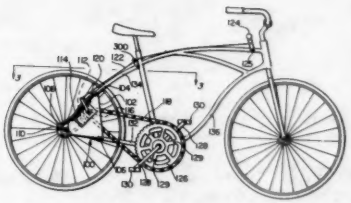
second gear means in said changeable speed transmission for interconnection with the rear sprocket of a standard bicycle;

chain means for interconnecting said second gear means and said rear sprocket;

transmission shift means, for shifting said changeable speed transmission from one speed to another; and

said attachment permitting use of said coaster brakes;

said transmission shift means comprising:



a gear shift lever, said lever being pivotally secured to a upper frame member of said bicycle;

a transmission hanger, said hanger being pivotally secured to an upper frame member of said bicycle such that said hanger is located midway between said lever and said housing means;

a force transmission lever pivotally mounted on said housing means, said force transmission lever cooperating with a gear change mechanism housed within said housing means;

a transmission cable having first and second ends, said first end being secured to an upper portion of said shift lever; and

said second end being secured to said transmission lever.

4,976,349

AEROFOIL/HYDROFOIL

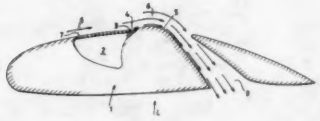
Richard C. Adkins, Milton Keynes, England, assignor to Cranfield Institute, England

Filed Jun. 2, 1988, Ser. No. 201,177

Claims priority, application United Kingdom, Jun. 4, 1987, 8713097

Int. Cl.[5] B64C *21/04*

U.S. Cl. 244—207 **8 Claims**



1. An aerofoil or hydrofoil comprising:

a curved convex surface on a side of the aerofoil or hydrofoil that is positioned in a direction of required lift;

fluid supply means including a nozzle for providing a high velocity primary jet of fluid directed to the curved surface to entrain and control the direction of a flow of secondary fluid;

a duct formed over a rear part of the convex surface downstream of said nozzle and extending from said convex surface to a surface of the aerofoil or hydrofoil remote from the convex surface;

whereby the convex surface, fluid supply means and duct are arranged to provide that a majority portion of the combined primary and secondary fluid flow is directed into the duct, the duct being directed at least at its exit end in a direction such that flow therethrough has a component of velocity opposite that of the required direction of lift.

4,976,350

APPARATUS FOR ACCOMMODATING BOX-LIKE ARTICLES

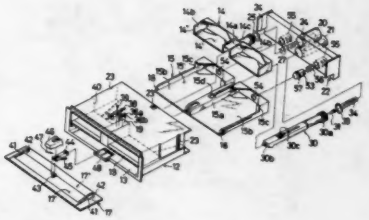
Masumi Fukumoto, Yokohama, Japan, assignor to Nifco Inc., Yokohama, Japan

Division of Ser. No. 181,049, Apr. 13, 1988, Pat. No. 4,890,735. This application Oct. 27, 1989, Ser. No. 427,378

Claims priority, application Japan, Apr. 13, 1987, 62-88725; Apr. 13, 1987, 62-88726; Apr. 13, 1987, 62-88727; Apr. 13, 1987, 62-88728; Apr. 13, 1987, 62-88729; Apr. 13, 1987, 62-88730; Aug. 4, 1987, 62-193699

Int. Cl.[5] B65D *35/676*

U.S. Cl. 206—387 **5 Claims**



1. An apparatus for accommodating box-like articles comprising a case open at least at the front for permitting box-like articles to be slidably accommodated through said front opening, biasing means for forwardly urging said box-like articles accommodated in said case, and locking means for locking said box-like articles in retreated positions thereof in said case against the biasing forces of said biasing means, said box-like articles being released from the locked state when they are further pushed from said retreated positions, wherein said locking means comprises a cylinder secured to said case, a piston rod slidable in said cylinder, a heart-like cam groove formed in the upper surface of an intermediate portion in the length of said piston rod, and a locking pin extending into said cam groove to swing along said cam groove.

4,976,351

KIT FOR DISTRIBUTING PHARMACEUTICAL PRODUCTS

Richard J. Mangini, Redwood City, and William J. Hartig, Pleasanton, both of Calif., assignors to Pharmedix, Hayward, Calif.

Filed Jun. 1, 1989, Ser. No. 359,514

Int. Cl.[5] B65D *69/00*

U.S. Cl. 206—232 **7 Claims**

1. A kit for distributing pharmaceutical products which are prepackaged in individual containers comprising:

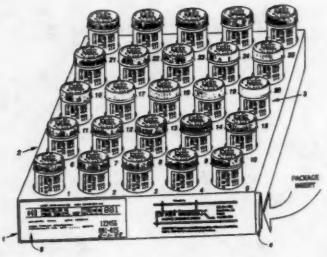
a tray having a predetermined number of holes in the top thereof, each of said holes being provided for holding one of said containers in an upright position, said tray having a tray label affixed thereto, said tray label having information printed thereon, said information including information identifying the type and quantity of pharmaceutical product contained in said containers and the party to whom said tray is to be delivered, numbers identifying the number of said containers in said tray and the number of said tray when two or more trays of said containers comprise a single order;

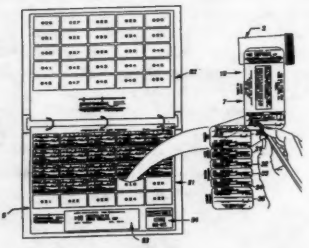
a multipart flag label attached to each of said containers, said flag label having a first rectangular sticker, said first sticker having a minor axis, a major axis, a first area, a second area and a third area, a first backing sheet and a second backing sheet, said first area, having lines of pre-printed information thereon which are orientated in a direction parallel to said minor axis and an adhesive on the back thereof, removably attached to said first backing sheet, said second area having lines of pre-printed information thereon which are orientated in a direction parallel to said major axis, said third area having an elongated space for the manual insertion of information therein and lines of pre-printed information thereon which are orientated in a direction parallel to said minor axis, said second and said third areas, having an adhesive on the back thereof, removably attached to said second backing sheet;

a plurality of stickers, each having pre-printed information thereon which is visible beyond the edge of said first sticker and an adhesive on the back thereof, removably attached to a third backing sheet; said third backing sheet having an extended portion which extends from the edge of said plurality of stickers beneath said first sticker, said extended portion being removably attached at one end to said second backing sheet near the end of said second backing sheet adjacent to an edge of said first backing sheet, a first one of said plurality of stickers adjacent to said first sticker having a first area thereof which extends beneath said third area of said first sticker;

means for automatically transferring information manually placed in said elongated space in said third area on said first sticker to said first area of said first one of said plurality of stickers;

a prescription log record for each batch of drugs shipped, said prescription having a plurality of numbered spaces and the date shipped, each of said numbered spaces corresponding to one of said containers in said tray.





4,976,352

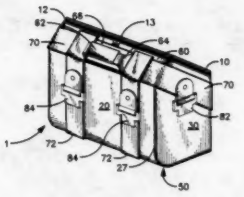
CAMERA BAG

Mark B. Nordstrom, Evergreen, Colo., assignor to Samsonite Corporation, Denver, Colo.

Filed Jun. 1, 1988, Ser. No. 201,006

Int. Cl.[5] A45C *11/38, 13/10, 13/26*

U.S. Cl. 206—316.2 **12 Claims**



1. A hand luggage for carrying camera equipment and the like, comprising a bag having a bottom panel, an upper portion including an openable lid for access to a main packing compartment, first and second end panels, a body side panel and a front side panel in opposing relation to said body side panel, said front side panel having an upper edge means for pivoting said lid about said upper edge of said front side panel, means for attaching a carrying strap to said bag, said upper portion including a handle facet having a handle thereon, said handle facet is connected to and upwardly positioned from said body side panel and forms an angle with said body side panel and is positioned between said body side panel and said lid whereby when said bag is carried by said carrying strap with said body side panel against the body of the user of said bag, said lid is spaced away from the body of the user by said handle facet.

4,976,353

PALLET BOX CONTAINER

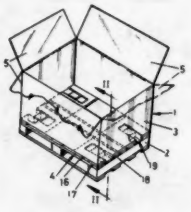
George M. Halliday, Edinburgh, United Kingdom, assignor to A&W Fullarton Limited, Glasgow, Scotland

Filed Jul. 28, 1988, Ser. No. 225,271

Claims priority, application United Kingdom, Aug. 5, 1987, 8718499

Int. Cl.[5] B65D *19/06*

U.S. Cl. 206—386 **2 Claims**



1. An arrangement comprising:

a pallet box container removeably fastened to a pallet for holding goods on the said pallet and having four side walls and a base including a pair of first base flaps and a pair of second base flaps, said base is provided with a plurality of articulatable lugs depending therefrom and foided around a plurality of pallet member portions without contact with an external structure which supports the bottom of the pallet and turned in through slots formed in said second pair of base flaps so the distal ends of the said articulatable lugs are inside the said pallet box container so as to secure said pallet box, container to said pallet in use of the said

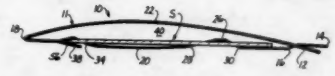
pallet box container, the said articulatable lugs being cut from and leaving voids in the said first pair of base flaps which close the bottom of the said pallet box container, whereby the said second pair of base flaps cover the voids left by the articulatable lugs, said second pair of base flaps containing slots formed therein, the said slots being accessible only from the bottom of the pallet, and said articulatable lugs being inserted to close the slots against access.

4,976,354

CARRIER PACKAGE FOR BIOLOGICAL SPECIMAN SLIDE

Abner Levy, 325 N. Oakhurst Dr., #4, Beverly Hills, Calif. 90210

Filed Mar. 12, 1990, Ser. No. 491,878
Int. Cl.[5] B65D *84/48, 73/00*
U.S. Cl. 206—456 **18 Claims**



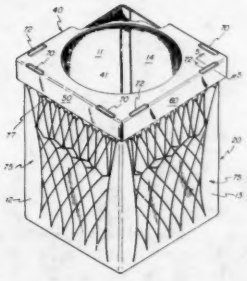
1. A package for a biological specimen slide, comprising:
an elongated sheet of foldable stock having two opposite ends and divided between said ends by a transverse crease line into a cover portion and a base portion;
retaining means engageable for fastening said ends together with said sheet folded along said crease line;
carrier means on said base portion between said crease line and said ends for retaining a slide between said portions of said folded sheet;
characterized in that said cover portion arches away from contact with a slide retained in said carrier means to protect a biological specimen deposited on the slide.

4,976,355

WASTE BASKET SIMULATED AS A BASKETBALL HOOP AND NET

E. Bryant Crutchfield, Dayton, Ohio, assignor to The Mead Corporation, Dayton, Ohio

Filed Mar. 23, 1990, Ser. No. 503,589
Int. Cl.[5] B65D *5/10*
U.S. Cl. 206—457 **3 Claims**



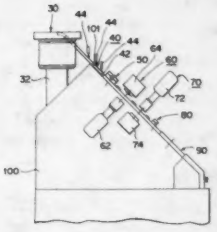
1. A waste basket comprising:
(a) a main body formed of a single blank of corrugated paperboard consisting of four side panels of the same dimensions integrally connected through fold lines in side-by-side relation,
(b) said blank having a flap on one end thereof secured to the opposite end thereof whereby said blank may be erected to form a container having an open top of square configuration and also folded to substantially flat condition,
(c) said blank also including a bottom panel extending from the bottom edge of each said side panel which cooperates with the other said bottom panels to close the bottom of said erected container,
(d) a cover of corrugated paperboard of square configuration proportioned to fit over the top of said erected container,
(e) said cover having a centrally located opening therethrough of circular configuration, and
(f) each of said panels having thereon a graphic representation of a basketball net which cooperates with said circular opening in said cover to provide said waste basket with the appearance of a basketball net.

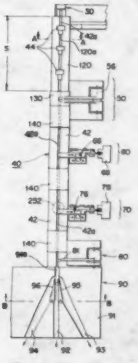
4,976,356

METHOD OF AND APPARATUS FOR OPTICALLY CHECKING THE APPEARANCES OF CHIP-TYPE COMPONENTS AND SORTING THE CHIP-TYPE COMPONENTS

Touru Mizuno, and Yasuhiko Kitajima, both of Tokyo, Japan, assignors to TDK Corporation, Tokyo, Japan

Filed Feb. 28, 1989, Ser. No. 316,791
Claims priority, application Japan, Mar. 31, 1988, 63-79578
Int. Cl.[5] B07C *5/02, 5/342*
U.S. Cl. 209—539 **28 Claims**





1. A method of optically checking the appearances of chip-type components and sorting the chip-type components, comprising the steps of:
a. feeding chip-type components onto chip-passage means to cause said chip-type components to run on said chip-passage means in a predetermined direction;
b. during the running of said chip-type components on said chip-passage means, individually separating said chip-type components to stop said chip-type components one by one at each of two predetermined checking positions;
c. irradiating light obliquely and straightly with respect to a

chip-type component at one of said predetermined checking positions to pick up an optical image of one of undersurface and top surface sides of said chip-type component as a video signal by means of a first TV camera;

d. irradiating light obliquely and straightly with respect to said chip-type component at the other of the predetermined checking positions to pick up an optical image of the other of the undersurface and top surface sides of said chip-type component as a video signal by means of a second TV camera;

e. sending said video signals to image processing sections, each of which includes at least an analog-to-digital conversion unit, a video memory and a central processing unit, to process said video signals in said image processing sections and obtain data on the appearance of said chip-type component and a tilt angle of said chip-type component on each said predetermined checking position of said chip-passage means, and checking on the basis of said data whether said chip is acceptable or defective in its appearance; and

f. thereafter sorting chip-type components on the basis of said check results.

4,976,357

ARTICLE DISPLAY

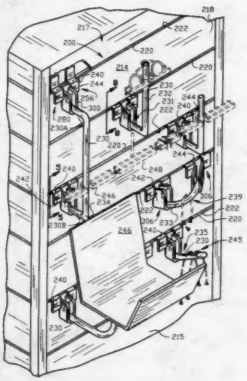
Robert C. Pearson, 7000 Bryan Dairy Rd. Bldg. B, Suite 1, Clearwater, Fla. 34647

Continuation-in-part of Ser. No. 928,469, Nov. 7, 1986, Pat. No. 4,787,520, which is a continuation-in-part of Ser. No. 791,356, Oct. 25, 1985, abandoned. This application Dec. 22, 1987, Ser. No. 136,373

The portion of the term of this patent subsequent to Nov. 29, 2005, has been disclaimed.

Int. Cl.[5] A47F *7/00*

U.S. Cl. 211—13 **5 Claims**



1. An article display tray for cooperation with a base and a supporting post attached to the base with the post extending vertically relative to the base and a bridging display tray including a first end and a second end with a trough extending therebetween for the positioning of at least one article to be displayed thereon and a first and a second attachment means positioned at the first end and the second end of the bridging display tray wherein the first and second attachment means are a mortise and a tenon, respectively, comprising:

a horizontal member including a first portion, a second portion and an intermediate portion;

each of said first and second portions of said horizontal member defines a first and second trough, respectively, to enable in use the positioning of the article to be displayed thereon;

said intermediate portion of said horizontal member defines a grasping means for releasingly gripping in use the supporting post to enable said horizontal member to be positioned along the vertical length of the supporting post;

said first and second portions of said horizontal member being axially spaced apart to provide an opening to permit said grasping means of said horizontal member to grippingly receive said supporting post;

said grasping means comprises a semicircle portion having two sidewalls leading from said semicircle portion thereby defining said opening formed by said axially spaced apart said first and second portion of said horizontal member to permit said semicircle portion to grippingly receive said supporting post such that in use said first and said second troughs of said horizontal member are positioned substantially entirely in front of the supporting post;

said horizontal member including a first end and a second end; and

a mortise and a tenon positioned at said first end and said second end of said horizontal member, respectively, for enabling in use the releasable attachment and interconnection of one of the mortise and tenon of the bridging tray to one of said mortise and said tenon of said horizontal member by forming a mortise and tenon joint between one end of said horizontal member and one end of the bridging display tray thereby enabling the removal of the bridging display tray as the final article displayed on the bridging display tray is removed to enable the article display to remain filled with displayed articles.

4,976,358

APPARATUS FOR GUIDING AND HOLDING PRINTED CIRCUIT BOARDS

Heinz Stickel, Groebenzell, and Peter Reihl, Munich, both of Fed. Rep. of Germany, assignors to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Mar. 30, 1990, Ser. No. 502,522

Claims priority, application Fed. Rep. of Germany, Mar. 31, 1989, 8903958[U]

Int. Cl.[5] H02B *1/02*

U.S. Cl. 211—41 **26 Claims**

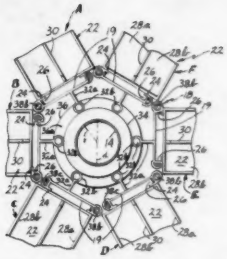
1. Apparatus for guiding and holding printed circuit boards which are guided at opposite edges, composed of an essentially U-shaped rail having at least two legs and having retainer elements directed outward in the direction of the legs and having a leg spacing of the legs that is somewhat greater when compared to the thickness of the printed circuit board and having at least one leg fashioned such that a leg spacing that falls below the thickness of the printed circuit board occurs for at least one location, comprising the legs oppositely corrugated in the direction of the rail; a respective antinode fashioned at ends of the rail; and connecting webs having retainer elements pointing out in a direction opposite that of the legs provided at the ends of the rail and for at least one antinode lying therebetween.

4,976,359

ROTATABLE ARTICULATED MERCHANDISE DISPLAY UNIT

Stephen N. Hardy, Copley, Ohio, assignor to American Greetings Corporation, Cleveland, Ohio

Filed Nov. 9, 1988, Ser. No. 269,233
Int. Cl.[5] B42F 7/00
U.S. Cl. 211—58 14 Claims



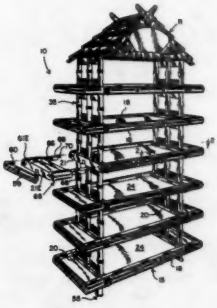
1. In a merchandise display unit comprising a generally vertical central support, an elongated column rotatably mounted on said support, said column being of generally polygonal configuration in plan and including sides hinged to one another for relative pivotal movement, and merchandise receiving trays extending outwardly from said column sides, said column sides and trays adapted to undulate upon rotation of said column and trays relative to said central support.

4,976,360

MERCHANDISE DISPLAY STAND

Armand S. Zucker, Skokie; David S. Breslow, Chicago, and Harald Giebel, Westchester, all of Ill., assignors to RTC Industries, Inc., Chicago, Ill.

Filed Jan. 12, 1990, Ser. No. 464,374
Int. Cl.[5] A47F 5/00
U.S. Cl. 211—186 15 Claims



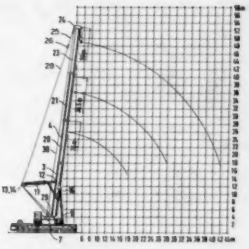
1. A display stand assembly comprising:
a plurality of main shelves, each of said main shelves comprising:
a lateral rim at opposite sides thereof, and
a tubular collar through said rim adjacent opposite ends thereof; and
a plurality of side upright members, each of said upright members comprising:
an upper cross beam and a lower cross beam,
a pair of open-top legs projecting upwardly from said upper cross beam adjacent opposite ends thereof, and
a pair of open-bottom legs depending from said lower cross beam adjacent opposite ends thereof,
said open-top legs being receivable in contour-accommodating relationship in the rim collars of a shelf positioned thereabove, and
said open-bottom legs being receivable in contour-accommodating relationship in the open-top legs of an upright member positioned therebeneath, whereby pairs of upright members positioned above and beneath a shelf operationally support said shelf therebetween.

4,976,361

MOBILE CRANE COMPRISING A TELESCOPIC BOOM

Rudolf Becker, Ehingen/Donau, Fed. Rep. of Germany, assignor to Liebherr-Werk Ehingen GmbH, Donau, Fed. Rep. of Germany

Filed Mar. 23, 1989, Ser. No. 327,887
Claims priority, application Fed. Rep. of Germany, Mar. 23, 1988, 3809790; Apr. 11, 1988, 3812032; Nov. 30, 1988, 3840408
Int. Cl.[5] B66C 23/04, 23/26
U.S. Cl. 212—231 5 Claims



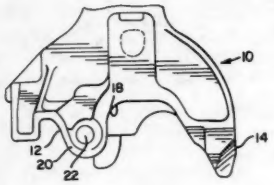
1. A mobile crane comprising
an undercarriage,
a deck rotatably mounted on the undercarriage,
a telescopic boom having a plurality of boom sections and a base box pivotably mounted on the rotating deck,
a luffing cylinder pivotably mounted on the boom and the rotating deck for pivoting the boom,
a guying yoke pivotably mounted on the telescopic boom near a middle of the base box, said guying yoke having two legs located on opposite sides of the base box with one end of the two arms pivotably mounted on the base box,
two axially aligned spaced apart rope pulleys rotatably mounted at an outer free end of the two legs of the guying yoke,
a winch mounted on the deck,
a guying rope,
a boom head located at an outer end of an outermost boom section,
a pulley block suspended from said boom head and having two reversing rope pulleys,
said guying rope extending from the winch around one rope pulley of the guying yoke, around one of the two reversing rope pulleys, around the other of said two reversing rope pulleys and back around the other rope pulley of the guying yoke to a fixed point located on the deck,
the winch and the fixed point being disposed on mutually opposite sides of the telescopic boom, adjacent to a pivotal axis at which said boom is pivotably mounted on the deck, and
the guying yoke being movable by a hydraulic piston-cylinder unit pivotably mounted at one end to the guying yoke at a point spaced from a pivotal axis at which the guying yoke is pivotably mounted to the base box and is pivoted at the other end to the base box near a middle thereof between the pivotal axis of the guying yoke on the base box and the pivotal axis of the telescopic boom on the deck.

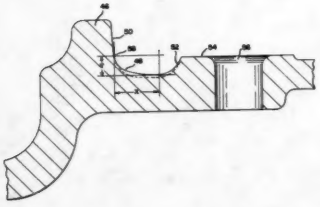
4,976,362

PULLING LUG FOR RAILWAY VEHICLE COUPLER

Horst T. Kaufhold, Chicago, Ill., assignor to AMSTED Industries Incorporated, Chicago, Ill.

Filed Aug. 4, 1989, Ser. No. 389,548
Int. Cl.[5] B61G *3/04, 3/00*
U.S. Cl. 213—152 **8 Claims**





1. A railway vehicle coupler comprising a head including at least one pulling lug, said pulling lug having a substantially vertical pulling surface for cooperation with a corresponding pulling surface on a knuckle, said substantially vertical pulling surface extending downwardly to engage a compound fillet having a variable radius, said compound fillet located behind said pulling lug and extending from said vertical pulling surface to a second radial fillet at a raised boss for a thrower hole, said variable radius of said compound fillet which increases with distance away from said substantially vertical pulling surface.

4,976,363

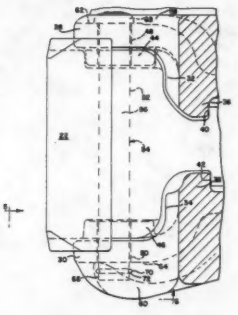
KNUCKLE PIN RETAINER FOR RAILWAY VEHICLE COUPLER

Russell G. Altherr, Munster, Ind., assignor to AMSTED Industries Incorporated, Chicago, Ill.

Filed Nov. 30, 1989, Ser. No. 443,497
Int. Cl.[5] B61G *3/00*
U.S. Cl. 213—155 **2 Claims**

1. An improved coupler head for use in joining adjacent railway vehicles wherein said coupler head includes a knuckle, said knuckle being secured within an opening located between an upper pivot lug and a lower pivot lug of said coupler head by a knuckle pin, said knuckle pin being received within a passageway formed by aligned apertures in said upper pivot lug, knuckle and lower pivot lug allowing for pivotal movement between said coupler head and said knuckle, said passageway having an elongated non-circular cross-section in said upper and lower pivot lugs and a circular cross-section in said knuckle, the improvement comprising:

an elastic retaining ring located within a circumferential groove on a portion of said knuckle pin which extends downwardly from said lower pivot lug end of said passageway, said elastic retaining ring which is free to rotate fully with said knuckle pin thereby allowing for continuous rotation of said knuckle pin within said passageway, said retaining ring projecting from said circumferential groove a distance to create a combined diameter greater than the diameter of said elongated non-circular passageway in said lower pivot lug, said lower pivot lug having a



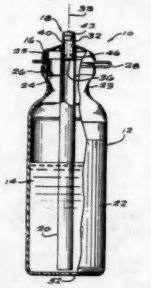
bottom surface which is chamfered about said elongated non-circular passageway to create a uniform circular area of contact for said retaining ring.

4,976,364

CAP AND STRAW ASSEMBLY FOR A WATER BOTTLE

Stanley B. Solomon, 29 Misty Acres Rd., Rolling Hills Estates, Calif. 90274

Filed Jan. 30, 1990, Ser. No. 472,651
Int. Cl.[5] B65D *47/24*
U.S. Cl. 215—229 **11 Claims**



1. A bottle cap and straw assembly for mounting onto a bottle body adapted to contain a selected liquid beverage, said assembly comprising:

a bottle cap having an upper side and a lower side and being adapted for mounting onto the bottle body with said lower side presented in a direction toward the interior of the bottle body;

a poppet valve carried by said cap and including a valve member accessible from said upper side of said cap for manual movement between open and closed positions for respectively permitting and preventing beverage passage through an outlet port defined by said poppet valve;

a drinking straw; and

means for mounting said straw onto said cap with one end of said straw generally circumscribing said poppet valve at said lower side of said cap and with said straw extending from said lower side of said cap into the interior of the bottle body when said cap is mounted onto the bottle body, such that the beverage within the bottle body can be drawn by sucking through said straw and said poppet valve when said valve member is in the open position.

4,976,365

PALLET AND CONTAINER INTEGRATED WITH PALLET

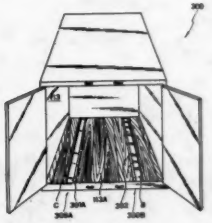
Dong J. Seo, 7-504, Hong-Jin Apt., Gye San-Dong, Buk-gu, Incheon, Rep. of Korea

Filed Nov. 13, 1989, Ser. No. 435,606

Claims priority, application Rep. of Korea, Aug. 7, 1989, 11215/89

Int. Cl.[5] B65D *88/00*

U.S. Cl. 220—1.5 **15 Claims**



9. A pallet system, comprising:

a pallet, comprising a platform for supporting articles thereon and having a top, a bottom and a first, a second, a third and a fourth side with said first and third sides and said second and fourth sides being parallel relative to each other to define a four sided platform;

a plurality of horizontal surface engaging wheels disposed on said bottom of said platform along a line parallel to the first side of said platform and along a line parallel to the third side of said platform for supporting in use said platform and articles placed thereon and for enabling in use said platform to be moved along a horizontal surface only in a straight line motion upon rotation of said plurality of horizontal surface engaging wheels;

a first and a second forklift tine receiving channel disposed at at least one side of said platform of said pallet for receiving in use the tines of a forklift to enable movement of said pallet by a forklift; and

a pallet receiving container, wherein said pallet receiving container comprises a supporting floor having a first and a second pallet wheel receiving groove, respectively, formed in said pallet supporting floor in a parallel and spaced apart manner relative to one another such that in use said plurality of horizontal surface engaging wheels disposed on said bottom of said platform along said line parallel to said first side of said platform and along said line parallel to said third side of said platform are each guidably received into said first and second pallet wheel receiving groove formed in said pallet supporting floor of said pallet receiving container, respectively, thereby preventing lateral movement of said platform relative to said floor when said plurality of horizontal surface engaging wheels have been received into said first and said second pallet wheels receiving grooves.

4,976,366

UNDERGROUND VALVE BOX

Jim L. Russell, 5018 S. Irvington Ave., Tulsa, Okla. 74135

Filed Jan. 10, 1990, Ser. No. 463,160

Int. Cl.[5] F16L *59/16*

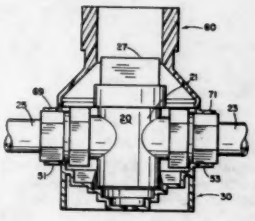
U.S. Cl. 220—4 B **17 Claims**

1. A box for encapsulating a service valve selected from a variety of valves having bodies with horizontal inlet and outlet lines disposed linearly therethrough comprising:

a tubular base having a horizontal member defining upper and lower portions thereof, said horizontal member having a plurality of concentric steps descending downwardly and inwardly therefrom into the lower portion of said base, said upper portion having a pair of topwardly accessible notches diametrically opposed in relation to said concentric steps; and

a tubular body having a pair of bottomwardly accessible notches alignable with said topwardly accessible notches;

each of said concentric steps having its diameter and depth coordinated to restrictively receive the body of at least



one of the variety of valves therein with the inlet and outlet lines of the selected valve disposed in said topwardly accessible notches; and

said tubular body being configured to securely removably gird said upper portion of said base with the inlet and outlet lines of the selected valve disposed in said bottomwardly accessible notches.

4,976,367

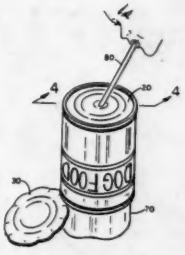
EASILY EMPTIED FOOD CAN

Raphael A. Hoefler, 8181 19th St., Westminster, Calif. 92683

Continuation-in-part of Ser. No. 329,948, Mar. 29, 1989, abandoned. This application Jan. 31, 1990, Ser. No. 474,208

Int. Cl.[5] B65D *17/50*; B67B *7/24*

U.S. Cl. 220—260 **2 Claims**



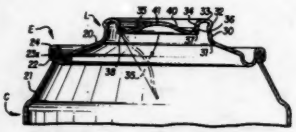
1. An easily emptied container comprising a side wall made of sheet material formed into a closed shape having a top and a bottom open end defined by the edges of said sheet material on opposite ends, said top end being slightly larger than said bottom end, a top lid sealed to said top open end of said container side wall, a bottom lid sealed to said bottom open end of said container side wall, said bottom lid having a round vent hole, said vent hole having a vent hole lip which is peened over in the direction of the interior of said container, said vent hole lip having a diameter approximating that of a common drinking straw whereby the insertion of said drinking straw into said vent hole lip results in an air tight fit between said drinking straw and said vent hole lip, said vent hole being covered by a removable vent seal tab, a contents for storage within said container, whereby, the removal of said vent seal tab and said top lid allow said container to be easily emptied when said container is inverted.

4,976,368

CONCENTRIC CONVENIENCE OPENING BEVERAGE CAN END

Gerald B. Klein, 13451 Stuart Ct., Broomfield, Colo. 80020

Filed Oct. 23, 1989, Ser. No. 425,309
Int. Cl.[5] B65D *17/32*
U.S. Cl. 220—268 **33 Claims**



1. In a beverage can end of drawn metal with a peripheral connection means about the expansion panel of the can end adapted to connect the can end to a can body, the improvement comprising:

(a) a lipped opening proportioned to facilitate drinking and pouring from a can, having a substantially vertical and circular wall upstanding from the expansion panel;

(b) a gate seating and hinging means within the embrace of the lipped opening wall;

(c) means connecting the seating and hinging means within the confines of the lip; and,

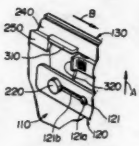
(d) a closure gate at the underside of the gate seating and hinging means, seated thereto and being opened by pushing it to swing downwardly about the hinging means, as from the seating means and to one side of the lipped opening wall.

4,976,369

CONTAINER

Nobuaki Shindo, Tokyo; Seiji Naruse, Kimitsu; Fumiaki Maeda, Kashiwa; Yuujirou Miyamoto, Chiba, and Toshio Takeuchi, Funabashi, all of Japan, assignors to Lion Corporation, Tokyo, Japan

Filed Nov. 14, 1988, Ser. No. 271,042
Claims priority, application Japan, Nov. 13, 1987, 62-173680
Int. Cl.[5] B65D *17/34, 25/32*
U.S. Cl. 220—270 **7 Claims**



1. A container comprising:

a main body including a bottom portion;

at least one end wall disposed at an outer edge of said bottom portion and a peripheral projection disposed outward peripherally on the outer surface of said end wall;

a lid member including a central portion;

a peripheral wall disposed at an outer edge of said central portion and a picking-up projection formed outward on said peripheral wall and oriented in an outward direction thereof;

a band member disposed through a score at an outer edge of said peripheral wall of said lid member and having a peripheral groove formed at an inner surface thereof, said groove for engaging with said peripheral projection of said lid member when said main body is covered with said lid member; and

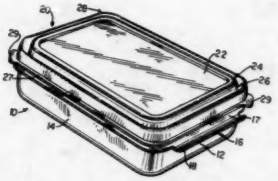
a peeling off projection formed on at least one of opposite ends of said band member and extended in a transverse direction thereof, said picking up and peeling off projections formed at a position near each other having the approximately identical height and being at approximately right angles to each other.

4,976,370

CONTAINER AND SEALING LID

Timothy S. Cassel, Boxborough, Mass., assignor to Tucker Housewares, Inc., Leominster, Mass.

Filed Jan. 12, 1990, Ser. No. 464,525
Int. Cl.[5] B65D *43/06*
U.S. Cl. 220—306 **9 Claims**



1. The combination of a container having an open top and a lid for sealing said open top comprising:

a container with a bottom wall and an upwardly extending continuous wall extending therearound

said container having a sealing bead around the upper peripheral edge of the wall, said sealing bead having an outer surface formed of two curved areas of different radii relative to the center line of the wall with the area of larger radius facing the outside of the wall,

a lid of the same general overall shape as the upper peripheral edge of the container, said lid having a downwardly extending generally U-shaped sealing channel for mating with the container sealing bead, said lid sealing channel having outer and inner side walls joined by an upper wall each having inner surfaces, the inner surface of the lid sealing channel upper wall between the inner surfaces of the inner and outer walls formed of areas of two different radii with the larger radius area being adjacent the inner surface of the channel outer side wall,

said container sealing bead and said sealing channel sized so that the sealing occurs on the part of the sealing bead and sealing channel radii of smaller diameter and there is a clearance between all other parts of the sealing bead and sealing channel to aid in fastening the lid to and removing it from the container.

4,976,371

RECEPTACLE LID SECURING DEVICE

Jeffrey A. Wise, 2525 Lake Dr.-R202, Singer Island, Fla. 33404, and Charles E. Naperski, 13175 155th Pl., Jupiter, Fla. 33478

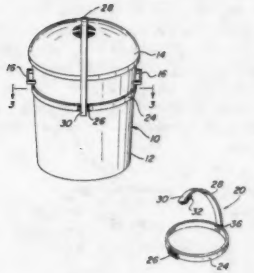
Filed Aug. 15, 1989, Ser. No. 394,129
Int. Cl.[5] B65D *45/00*
U.S. Cl. 220—315 **15 Claims**

1. A lid securing device for securing a lid to a trash receptacle, said lid securing device comprising:

a lid strap, said lid strap having a first hooks-and-loops engagement means;

a receptacle loop adapted to circumferentially engage said trash receptacle, said receptacle look having a second hooks-and-loops engagement means, said first engagement means being adapted to engage said second engagement means, whereby said receptacle loop can be engaged to

said trash receptacle and said lid strap can be engaged to said receptacle loop, such that said lid strap can be firmly



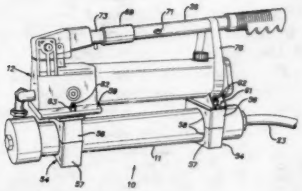
fastened over said lid to retain said lid securely to said trash receptacle.

4,976,372

HIGH-PRESSURE HYDRAULIC GUN

Elmer V. Rogers, Jr., North Olmsted, Ohio, assignor to The Pipe Line Development Company, Westlake, Ohio

Filed Jun. 9, 1989, Ser. No. 364,802
Int. Cl.[5] B65D *88/54*
U.S. Cl. 222—324 12 Claims



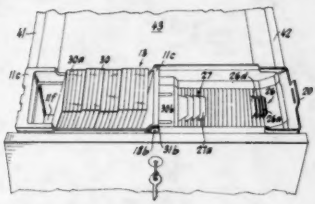
1. A high-pressure hydraulic gun for injecting flowable sealant or the like comprising a barrel having walls that form an interior cylindrical bore closed at opposite ends, a piston assembly sealed with and slidable within the bore, the piston assembly dividing the barrel bore into a hydraulic fluid pressure chamber and a material receiving chamber, a hydraulic pump assembly including a pump piston housing having an internal cylinder, a piston within the pump cylinder, a manually operable handle pivotal on the housing, means connecting the handle to the piston whereby pivotal movement of the handle causes reciprocation of the piston, a reservoir for hydraulic fluid formed by a hollow elongated chamber having one end rigidly directly attached to the pump housing, the ends of the pump assembly being formed respectively by the pump housing and an end of the reservoir opposite said one end, the piston being adapted to receive hydraulic fluid from the reservoir and pump it out of the housing through an associated port, a port on a wall of the cylinder communicating with the hydraulic fluid chamber, means connecting the pump port to the hydraulic fluid chamber port whereby fluid pumped by said pump piston is conducted into said hydraulic fluid chamber, means mounting said pump assembly alongside said barrel, said mounting means including elements adjacent each end of the pump assembly extending between and rigidly joining the pump assembly to the barrel, said elongated reservoir extending alongside a substantial portion of the length of said barrel, the mounting means avoiding excessive stress on the pump housing and the pump port connecting means by transferring at least a portion of any forces tending to displace the pump assembly relative to the barrel directly to the barrel at a location adjacent the opposite end of the reservoir, said gun including supporting surface means adapted to support said gun on a surface parallel to said barrel, said supporting surface means including elements defining a flat plane, said elements being disposed at locations spaced axially along the barrel a distance substantially at least as great as the length of said reservoir, said flat plane defined by said elements of said supporting surface means being on a side of said barrel opposite said pump assembly whereby pumping forces on said handle towards said barrel are adapted to be transferred by said elements to a floor surface or the like in a stable manner.

4,976,373

SUSPENDABLE HINGED LOCKABLE LID STORAGE BOX

Thomas E. Perdue, Jr., Crystal Lake; Jeffrey D. Brausky, Claredon Hills; William S. Carvell, Mount Prospect; David E. Dettloff, Skokie; Duane K. Ischay, and Kenneth H. Oberg, both of Barrington, all of Ill., assignors to ACCO World Corporation, Wheeling, Ill.

Filed Mar. 31, 1989, Ser. No. 331,408
Int. Cl.[5] B65D *43/24;* B65S *85/57*
U.S. Cl. 220—335 7 Claims



1. A storage box having a hinged lid comprising
a storage chamber, a forward wall and a rearward wall having a top opening lying substantially in a first plane and having a first support lip element extending from the forward wall;
a hinged lid lying substantially in a second plane having a second support surface element;
a lock arrangement on the rearward wall and the lid for locking the hinged lid in an open position such that the first and second planes are substantially parallel, the lock arrangement in turn comprising
(1) a first engagement means on the chamber and
(2) a second engagement means on the lid which second means is engageable with the first means
so that the storage box can be supported between the spaced-apart first and second support elements with the storage chamber lip resting on one element and the hinge lid resting on another element.

4,976,374

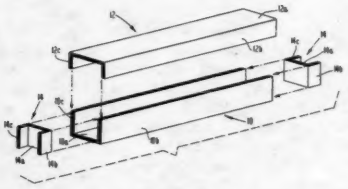
PACKING CONTAINER

Vincent A. Macaluso, Trappe, Pa., assignor to Cornerboard, Inc., Bridgeport, Pa.

Continuation of Ser. No. 180,187, Apr. 11, 1988, abandoned. This application Mar. 29, 1990, Ser. No. 501,955
Int. Cl.[5] B65D *1/40*
U.S. Cl. 220—453 11 Claims

1. A packing container comprising:
a preformed, rigid, laminated paperboard base unit of U-shaped cross-section laminated throughout its entire cross-section and having a bottom portion and opposed sidewalls;

and a preformed, rigid, laminated paperboard cover unit of U-shaped cross-section laminated throughout its entire cross-section and having a top portion and opposed sidewalls, said cover unit so sized that said sidewalls of said base unit are fitted within and embrace said sidewalls of said cover unit when said base unit and said cover unit are assembled as a container.



4,976,375

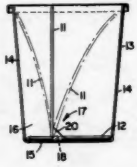
WASTEBASKET DIVIDER

Roger C. Quam, Gem Lake, Minn., assignor to Waste-Not, Inc., Willernie, Minn.

Filed Mar. 20, 1989, Ser. No. 325,681

Int. Cl.[5] B65D *25/06*

U.S. Cl. 220—534 **10 Claims**



1. An apparatus for dividing a wastebasket having side walls and a bottom wall into multiple compartments, comprising:

(a) a base member;

(b) a divider wall having an upper end and an opposite bottom end interconnected to said base member, first and second compartments being defined by said divider wall and the wastebasket side walls, wherein movement of said upper end of said divider wall in a first direction allows an upper end of said first compartment to be closed off, and movement of said upper end of said divider wall in a second direction allows an upper end of said second compartment to be closed off; and

(c) means for adjusting the position of said divider wall relative to said base member, wherein said adjustment means allows for changing the size of said compartments.

4,976,376

PRIZE DISPENSING MACHINE PROVIDING THE APPEARANCE OF DISCHARGING PRIZES AS A MATTER OF CHANCE

Geoffrey A. Williams, Rochdale, England, assignor to Topline Leisure Ltd., England

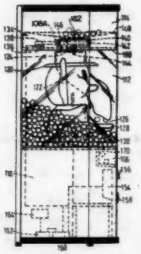
Filed Feb. 13, 1989, Ser. No. 309,155

Claims priority, application United Kingdom, Feb. 16, 1988, 8803573

Int. Cl.[5] G07F *11/00*

U.S. Cl. 221—24 **10 Claims**

1. A dispensing machine comprising: a first receptacle having an outlet for a plurality of prize-containing packages; a second receptacle having an animal-like figure at least a part of which is movable relative to the first prize-containing receptacle; a partition separating the first receptacle from the second receptacle, and including a partition opening offset from the outlet of the first receptacle; said movable part of the animal-like figure in the second receptacle having an internal passage with an inlet capable of being in register with the partition opening in the partition, and an outlet arranged to discharge prizes to a third prize receiving receptacle; and gating means disposed between the first and second receptacles for transporting a prize-containing package from the outlet of the first receptacle to the partition opening for entry into the inlet of the internal passage in the second receptacle; the machine further comprising a plurality of non-prize containing packages in the second receptacle through which the movable part of the animal-like figure is movable, actuating means comprising a mechanism arranged to receive coins or tokens, and drive means actuated by the actuating means upon receipt of a predetermined number of coins or tokens for driving at least the movable part of the animal-like figure and the gating means to receive a prize-containing package from the outlet of the first receptacle and transport the prize-containing package from the outlet of the first receptacle to the partition opening for entry into the inlet of the internal passage in the second receptacle so that the prize-containing package is released from the prize-containing receptacle into the passage.



4,976,377

LIQUID AND POWDER MEASURING APPARATUS

Noboru Higuchi; Chuzo Kobayashi; Yasunori Ichikawa; Keizo Matsui, and Shigeru Yamaguchi, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

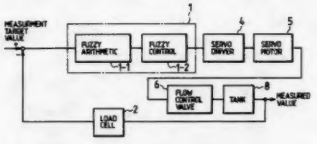
Filed Aug. 22, 1988, Ser. No. 234,869

Claims priority, application Japan, Aug. 21, 1987, 62-206587; Aug. 21, 1987, 62-206588; Oct. 1, 1987, 62-245755; Oct. 1, 1987, 62-245757; Oct. 14, 1987, 62-257393

The portion of the term of this patent subsequent to May 16, 2006, has been disclaimed.

Int. Cl.[5] B67O *5/08*

U.S. Cl. 222—55 **11 Claims**



1. A closed loop measuring apparatus, comprising:

a supply tank containing a stock material;

a motor;

a flow regulating valve attached to an outlet of said tank and having a linear stroke controlled by an operation of said

motor, said valve providing a flow rate therethrough of said stock material which is substantially linear with said stroke and which is finely controlled over an entire range of flow rates between a closed position of said valve to a fully open position;

a detector for measuring a quantity of said stock material transferred through said valve; and

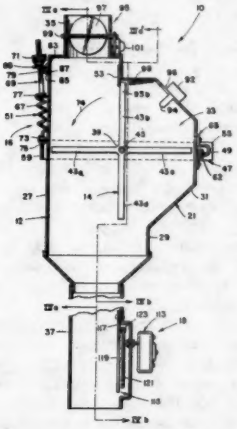
a control unit receiving an output of said detector and a measurement target value and controlling said motor in a successive closed loop operation cycle.

4,976,378

FEED METERING MECHANISM

Jerome J. Bush, Holland, Mich., assignor to Hamilton Distributing Company, Hamilton, Mich.

Continuation of Ser. No. 236,157, Aug. 25, 1988, abandoned.
This application Mar. 19, 1990, Ser. No. 497,733
Int. Cl.[5] B67D *5/08*
U.S. Cl. 222—55 12 Claims



1. A metering device for measuring the weight of particulate material being dispensed, comprising:

a hollow casing having an inlet port and an outlet port to facilitate the flow of material through said casing;

a paddle gate rotatively received within said casing and including a number of vanes adapted to selectively receive the material entering through said inlet port, said paddle gate rotating at predetermined intervals to dispense the material to said outlet port;

a regulating means for controlling the rotation of said paddle gate;

a control means for monitoring the back up of the material in said outlet port and for interrupting the incoming flow of material into said casing through said inlet port when the material has backed up in said outlet port to a predetermined position, whereby the jamming of the paddle gate through the back up of material is effectively avoided, said control means including a control switch in said outlet port to monitor said back up of particulate meterial therein, and a valve in said inlet port to interrupt the flow of material when said control switch is activated by the backed up material; and

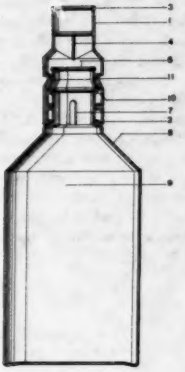
a paddle gate switching means for sensing the rotation of said paddle gate and actuating said valve to close when said paddle gate is rotating and to open when said paddle gate is stationary.

4,976,379

DISPENSING CONTAINER WITH INTEGRAL FUNNEL

Daniel C. Sloan, 2701 Riverside Dr., Ste. 208b, Coral Springs, Fla. 33065

Filed May 23, 1988, Ser. No. 197,589
Int. Cl.[5] B67B *7/24*
U.S. Cl. 222—83 7 Claims



1. A container enclosure assembly designed to facilitate emptying of the contents thereof without spillage, said assembly comprising:

a. a container body comprising a hollow interior in which a product may be stored,

b. an outlet portion formed on said body and including a substantially elongated neck having one open end and an opposite end formed on said neck adjacent said body and in communicating relation with said hollow interior,

c. a membrane formed of a rupturable material and disposed in covering, sealing engagement with said open end of said neck, whereby product within said hollow interior is prevented from exiting therefrom through said open end,

d. funnel means for directing flow out of said container body movably mounted on said neck along the length thereof and including an outer open end disposed and aligned in communicating relation with said open end of said neck and an open inner end including a periphery disposed in surrounding relation to said neck,

e. stop means resisting axial displacement of said funnel means relative to said outlet portion and into an operative position and comprising a first stop portion and a second stop portion formed on an external surface of said neck and on an internal surface of said funnel means respectively,

f. said first and second stop portions each including an integrally formed protrusion having a substantially continuous annular configuration mounted on said external surface of said neck and on said internal surface of said funnel means respectively, said protrusions formed of a flexible material and disposed in abutting, interruptive relation to one another,

g. said protrusions disposed to initially resist displacement of said funnel means along the length of said neck into said operative position and structured to include sufficient flexability to force passage of said protrusions of said first and second stop portions beyond one another in opposite directions and into said operative position upon application of an opposing external, axially applied force to said funnel means and said container body concurrently,

h. a retension means removably mounted on said neck in interruptive relation to passage of said funnel means along the length of said neck for preventing movement of said funnel means into said operative position,

i. guide means formed both on said neck and said funnel means in alignable relation to one another for facilitating linear displacement of said funnel means relative to said neck,

j. said guide means comprising a plurality of elongated ribs formed on said neck and extending along a major portion of the length thereof and a plurality of channels formed on said periphery of said open inner end of said funnel means, said plurality of ribs and said plurality of channels disposed in aligned relation to one another and movably relative to one another into sliding engagement, said rib elements and said plurality of channels, when cooperatively engaged, being disposed and dimensioned to allow linear movement and prevent rotational movement of said funnel means relative to said neck,

k. said funnel means further structured to penetrate said membrane and access said hollow interior upon forcing of said funnel means into said operative position, and

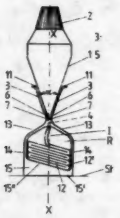
l. said operative position further defined by an open path of product flow from said hollow interior through said open end of said neck to said outer open end of said funnel means.

4,976,380

DEVICE FOR EMPTYING TUBES

Alfred von Schuckmann, Kevelaer, Fed. Rep. of Germany, assignor to Franz Pohl Metall- und Kunststoffwarenfabrik GmbH, Karlsruhe, Fed. Rep. of Germany

Filed Mar. 21, 1989, Ser. No. 327,520
Int. Cl.[5] B65D *35/28*
U.S. Cl. 222—103 **19 Claims**



1. A device for emptying a tube, including the emptying of a toothpaste tube, the tube having an outlet port in the form of a mouthpiece through which contents of the tube are emptied, the device comprising

a flat mouth slide which widens in V-shape toward the tube mouthpiece, the flat mouth slide having a tube squeezing slot, the flat mouth slide having V-walls oriented at an acute angle to each other in the form of a V, the tube squeezing slot cooperating with the flat mouth slide to form expulsion jaws which are flexible for displacement against a restoring force;

a receiving chamber lying on a side of the squeezing slot facing away from the tube mouthpiece for receiving an emptied tube section;

a bottom wall closing off the receiving chamber; and

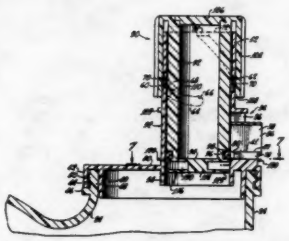
the bottom wall forms a standing surface for supporting the tube.

4,976,381

METHOD AND APPARATUS FOR DISPENSING LIQUID

William R. Scholle, Corona Del Mar; Chester Savage, Irvine, both of Calif., and William A. Hardwick, Jr., Boerne, Tex., assignors to Scholle Corporation, Irvine, Calif.

Continuation-in-part of Ser. No. 298,368, Jan. 18, 1989, abandoned. This application Sep. 5, 1989, Ser. No. 403,189
Int. Cl.[5] B67D *3/00, 3/04*
U.S. Cl. 222—484 **44 Claims**



1. A dispensing container comprising

a container body,

a spigot fixed to and extending outwardly of said container body and having an internal bore in communication with the interior of the container,

said spigot having a pour spout and a vent port in communication with said bore, said pour spout being positioned between said container and said vent port, and

a slidable closure member mounted within the spigot bore for motion axially of the spigot,

said closure member having a sealing end including sealing means engaging said bore, said closure member being movable from a closed inner position, wherein said sealing means are positioned inwardly of said pour spout, to an outer dispensing position wherein said sealing means are positioned outwardly of said vent port, said closure member including means on said sealing end cooperating with said bore for restricting flow of liquid from said container through said vent port while allowing flow of air inwardly through said vent port to the interior of said container.

4,976,382

QUICK RELEASE STRINGER

Jerry W. Carpenter, 503 Border, Orange, Tex. 77630

Filed Aug. 7, 1989, Ser. No. 390,098
Int. Cl.[5] A01K *65/00*
U.S. Cl. 224—103 **4 Claims**

1. A fish stringer including:

a stringing needle;

a cord;

means for coupling one end of the cord to the needle;

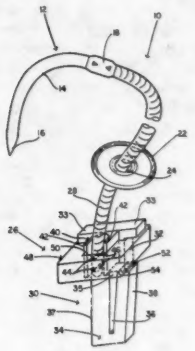
a stop slidably coupled on the cord;

a support member having an upper support portion having protruding members coupled to uppermost end portions thereof, a lower support portion having a stationary member coupled to the upper support portion and a movable member coupled to the stationary member; and

first fastening means coupled to the support member for fastening the other end of the cord to the support member; and

second fastening means slidable mounted on the support

member for covering the first fastening means and for lockingly engaging the support member so that the cord



can be selectively fastening and released to permit fish to be coupled onto and released from the cord.

4,976,383

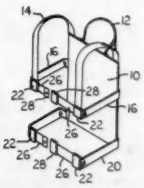
BACKPACK BELT CONSTRUCTION

Gary R. Norris, Hwy. 321, Box 273-B, Sugar Grove, N.C. 28679

Filed Nov. 13, 1989, Ser. No. 435,620

Int. Cl.[5] A45F *3/04*; B65H *75/48*

U.S. Cl. 224—215 **14 Claims**



1. A backpack comprising a panel adapted to extend along the wearer's back; two laterally-spaced shoulder straps connected to an upper edge of said panel for extension over the wearer's shoulders and downwardly onto his chest area; two side straps extending between side edges of the panel and frontal sections of said shoulder straps; a belt structure forming a frontal extension of each side strap for horizontal disposition on the front of the wearer wherein each belt structure as a free end; and quick-connect buckle components located on the free ends of the belt structures, whereby the belt structures can be connected together at a point along the front of the wearer; at least one of said belt structures comprising a housing attached to the associated side strap, a rotary reel located within said housing, and a flexible belt element wound on and around the reel a multiple number of turns wherein one of said quick-connect buckle components is attached to said flexible belt element, whereby said belt element can be extended from the housing or retracted into the housing so as to fit snugly around different size wearers.

4,976,384

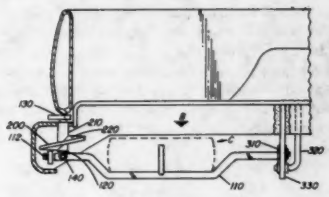
SPARE TIRE STORAGE APPARATUS

Lonnie E. Daniels, LaGrange, Tex., assignor to Steven J. Terrell and Joe Terrell, Weimar, Tex.

Filed Apr. 25, 1989, Ser. No. 344,104

Int. Cl.[5] B62D *43/00*

U.S. Cl. 224—42.23 **8 Claims**



1. A spare tire storage apparatus for use on a motor vehicle, comprising:

a substantially vertical first pivot member attached to the frame of the vehicle;

a substantially horizontal second pivot member attached to said first pivot member;

a carriage rack pivotably attached near a first end thereof to said first and second pivot members so as to pivot in a horizontal plane about said first pivot member and simultaneously pivot in a vertical plane about said second pivot member;

operating means for causing said carriage rack to pivot about said first pivot member;

a cam surface attached to the vehicle near said carriage rack; and

cam roller means attached to said carriage rack so as to follow along said cam surface and thereby cause said carriage rack to pivot about said second pivot member as said carriage rack is pivoted by said operating means about said first pivot member.

4,976,385

HOLDER FOR TUBULAR CONTAINER

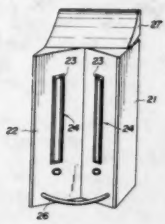
Takashi Matsumoto, Iwaki, Japan, assignor to Matsumoto Design Company Limited, Fukushima, Japan

Filed Dec. 2, 1988, Ser. No. 279,102

Claims priority, application Japan, Dec. 21, 1987, 62-193575; Oct. 12, 1988, 63-133626

Int. Cl.[5] B60R *7/00*

U.S. Cl. 224—42.42 **2 Claims**



1. A holder for holding, in an upright position, a tubular container having a magnetically attractable component, said holder comprising:

a base body having an upper part and a lower part and defining a front face extending between said upper and lower parts;

at least two magnet parts mounted to said base body and comprising magnets which generate magnetic forces at the front face of said base body;

a resilient support mounted to said base body and disposed below said magnets, said resilient support extending outwardly of the front face of said base body; and

a guide slope plate located at the upper part of said base body, said guide slope plate defining a surface inclined, as taken in an upward direction extending outwardly of the upper part of the base body, from the front of said base body at which said front face is defined toward the rear of said base body such that a clearance having a wedge-shaped cross section is defined between said surface and a tubular container having a magnetically attractable component disposed against the front face of said base body when such a tubular container is attracted to said front face by said magnets.

4,976,386

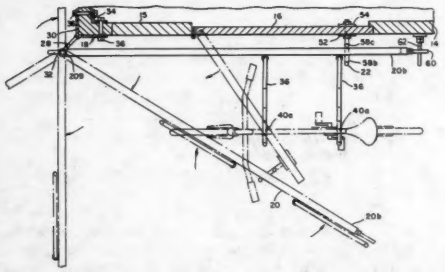
BICYCLE CARRIER

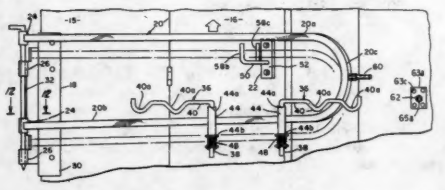
John Geiger, P.O. Box 593, Blue Jay, Calif. 92317

Filed Jun. 19, 1989, Ser. No. 367,880

Int. Cl.[5] B60R *9/00*

U.S. Cl. 224—42.45 R **4 Claims**





1. A bicycle carrier for use in connection with a camper unit of the character mounted on a pickup truck and having a rear wall and an outwardly swinging access door provided in said rear wall, said bicycle carrier comprising:

(a) a mounting bracket assembly connectable proximate a rear corner of the camper;

(b) a bicycle supporting assembly for supporting at least one bicycle including:

(i) a frame having first and second ends, said frame being connected at said first end to said bracket assembly for pivotal movement from a first position, wherein said second end of said frame is disposed proximate the rear wall of the camper unit, to a second position wherein said second end of said frame is spaced apart from the rear wall of the camper unit, said frame further including a pair of vertically spaced apart upper and lower frame members interconnected by a curved portion comprising said second end of said frame; and

(ii) outwardly extending bicycle supports pivotally connected to said upper frame member, said bicycle supports being movable from an outwardly extended position into a folded position wherein said bicycle supports are substantially coplanar with the plane of said upper and lower frame members;

(c) connector means mounted on the access door of the camper unit for operable association with said frame to cause said bicycle supporting frame to move from said first position to said second position when said access door is opened, sad connector means comprising a first member extending outwardly from said access door and a pair of spaced apart upstanding legs connected to said first member, said upper frame member being receivable between said upstanding legs.

4,976,387

BODY-MOUNTED SUPPORT

Dany Spianti, Chartres, France, assignor to Sachtler AG Kommunikationstechnik, Garching, Fed. Rep. of Germany

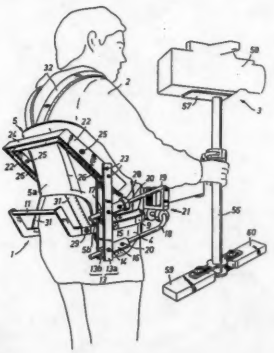
PCT No. PCT/EP88/00163, § 371 Date Jan. 19, 1989, § 102(e) Date Jan. 19, 1989, PCT Pub. No. WO88/06695, PCT Pub. Date Sep. 7, 1988

PCT Filed Mar. 3, 1988, Ser. No. 274,936

Claims priority, application France, Mar. 3, 1987, 87 02859

Int. Cl.[5] A45F *3/08*

U.S. Cl. 224—262 **9 Claims**



1. A body-mounted support, in particular for cameras, having a support framework worn by a cameraman and mobile, equilibrated arms for holding the camera, said support comprising:

(a) a frame including a rigid, essentially annular shell defined by two opposed half-shells, the half shells including a curved front lower half-shell adapted to engage a front part of the body of a cameraman and a curved rear upper half-shell adapted to engage a back part of the body of a cameraman, which half-shells are axially offset from each other so that they are situated at different levels of a cameraman's body and can be supported on a stomach region and a rear lumbar region, respectively, of a cameraman;

(b) a pair of spaced, superposed half-frame members extending laterally outwardly in a forward direction from the angular shell, and including attachment means provided symmetrically on both sides of the shell for pivotally supporting the two half-frames relative to the shell, and connecting means carried by the half-frames for connecting the half-frames together so that they are at all times mutually parallel throughout their range of pivotal movement;

(c) the connecting means including an articulated connecting part adjacent their forwardmost parts to which camera can be connected; and

(d) the attachment means including counterbalance means provided between at least one of the half-frames and the

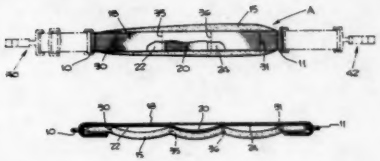
shell in order substantially to counterbalance the weight of a camera.

4,976,388

SHOULDER STRAP ASSEMBLY HAVING LIMITED STRETCHABILITY

James D. Coontz, 3832 E. Acorn, Simi Valley, Calif. 93063

Filed Jan. 30, 1990, Ser. No. 472,242
Int. Cl.[5] A41F *15/02*
U.S. Cl. 224—264 6 Claims



1. A shoulder strap assembly having a limited amount of stretchability, comprising, in combination:

elongated resilient strap means having an under surface adapted to cushionably rest upon the shoulder of a wearer, and being adapted to support a load between its two ends;

auxiliary strap means disposed above and in parallel relation to said elongated resilient strap means, said auxiliary strap means including first and second separate end sections made of a relatively non-stretchable material, and also including a separate center section made of material which is longitudinally stretchable;

first and second transverse stitch means securing the inner ends of said first and second end sections of said auxiliary strap means both to the corresponding ends of said stretchable center section thereof, and to said elongated resilient strap means;

means securing the ends of said auxiliary strap means to respective ends of said elongated resilient strap means; and

separate load-attachment means secured to respective ends of said auxiliary strap means;

said strap assembly being responsive to the weight of a load such that the middle portion of said strap assembly between said first and second stitch means may stretch by a substantial amount, but said non-stretchable end sections of said auxiliary strap means prevent any substantial stretching of the end portions of said strap assembly.

4,976,389

BICYCLE COVER

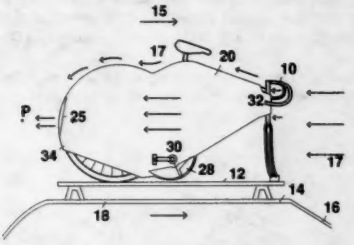
Michael F. McLellan, Monmouth, Me., and Reza S. Abhari, Somerville, Mass., assignors to Cyclone Products Corporation, Cambridge, Mass.

Filed Apr. 7, 1989, Ser. No. 334,324
Int. Cl.[5] B06R *9/10*
U.S. Cl. 224—328 9 Claims

1. A cover for a bicycle which is to travel in an airstream in a specified direction comprising:

a first flexible member having a rear portion in relation to the direction of travel of the bicycle in the airstream; a second flexible member having a rear portion in relation to the direction of travel of the bicycle in the airstream; and fastening means for fastening said first flexible member to said second flexible member;

wherein said first and second flexible members are adapted to substantially cover the bicycle and define an aperture



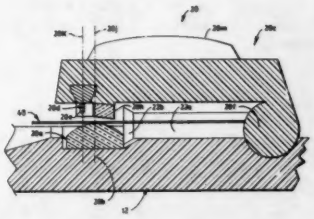
located between the rear portions of said first and second flexible members when fastened by said fastening means.

4,976,390

POCKET FIBER OPTIC CLEAVER

Arnold E. Gee, and Jeffrey B. Shank, both of Williamsport, Pa., assignors to GTE Products Corporation, Stamford, Conn.

Filed Sep. 20, 1988, Ser. No. 247,002
Int. Cl.[5] C03B *37/16*
U.S. Cl. 225—96 4 Claims



1. In a pocket fiber optic cleaver having an elongated substantially cylindrical body arrayed along a longitudinal body axis, said body having, in longitudinal sequence, a fiber entry port, a cut-length adjusting section, a cleaving area, and a waste fiber exit port, and including a cylindrical bore concentric with said longitudinal axis for receiving and optical fiber, the improvement wherein said cleaving area comprises: a cleaving pad in the form of a cylindrical section whose longitudinal axis is arrayed orthogonal to said body axis; a spring loaded pivot arm adjacent said cleaving pad, said arm carrying a fiber scoring member and having its pivot point adjacent said exit port, said fiber scoring member being adjacent said cut-length adjusting section; and a U-shaped pressure pad having a bight defined by three closed sides and an open side, said three closed sides substantially surrounding said scoring member, said open side facing said cut-length adjusting section.

4,976,391

ADJUSTABLE PAPER GUIDE FOR ACOUSTIC PRINTER ENCLOSURE

Ross A. Jessen, and Craig D. Drake, both of Muscatine, Iowa, assignors to Ring King Visibles, Inc., Muscatine, Iowa

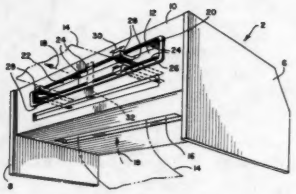
Filed Aug. 31, 1988, Ser. No. 238,916
Int. Cl.[5] B65H *23/04;* B41J *19/04, 29/10*
U.S. Cl. 226—196 10 Claims

5. An adjustable paper guide system for transporting paper through an enclosure panel, comprising:

a grommet for mounting in an opening in said enclosure

panel for transporting paper therethrough, said grommet including a peripheral surface with substantially longitudinal surface sections and retaining ridges extending outward along each of said longitudinal surface sections, with at least one of said retaining ridges comprising a linear projection extending from a collar region of said grommet;

at least one support base slidably mounted to said longitudinal surface sections and over said retaining ridges with a



freedom of movement along a sliding axis substantially parallel to the length of said longitudinal surface sections, having a channel extending through each said support base transverse to said sliding axis of said support base; and

a tongue guide slidably mounted to said support base through said channel for guiding paper through said grommet, each tongue guide having a sliding axis substantially transverse to said sliding axis of said support base on said grommet.

4,976,392

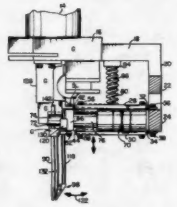
ULTRASONIC WIRE BONDER WIRE FORMATION AND CUTTER SYSTEM

Michael C. Smith, and Hal W. Smith, Jr., both of Costa Mesa, Calif., assignors to Orthodyne Electronics Corporation, Costa Mesa, Calif.

Filed Aug. 11, 1989, Ser. No. 392,435

Int. Cl.[5] B23K *20/10*

U.S. Cl. 228—102 **49 Claims**



1. An ultrasonic wire bonder having a wire bonding tool that is connected to a transducer for ultrasonic wire bonding of a wire that is implaced under the tool for bonding it to a surface therebelow wherein the improvement comprises:

delivery means for delivering wire to the end of said bonding tool having at least two surfaces extrinsic to the cross section of said wire bonding tool in displaced relationship from the axis over which the wire moves in order to work it in a direction to remove coil set from the wire.

4,976,393

SEMICONDUCTOR DEVICE AND PRODUCTION PROCESS THEREOF, AS WELL AS WIRE BONDING DEVICE USED THEREFOR

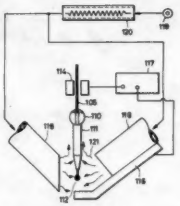
Makoto Nakajima, Takasaki; Yoshio Ohashi, Tamamura; Toshio Chuma, Takasaki; Kazuo Hatori; Isao Araki, both of Tamamura; Masahiro Koizumi, Hitachi; Jin Onuki, Hitachi; Hitoshi Suzuki, Hitachi, and Susumu Okikawa, Ohme, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Dec. 17, 1987, Ser. No. 134,458

Claims priority, application Japan, Dec. 26, 1986, 61-308435; Apr. 8, 1987, 62-84758; May 27, 1987, 62-128245; May 27, 1987, 62-128246

Int. Cl.[5] H01L *21/607*

U.S. Cl. 228—111 **33 Claims**



1. A fabrication method for a semiconductor device having a semiconductor pellet, at least one bonding pad, having a major surface, disposed on one major surface of the pellet, and at least one lead member disposed outside the pellet, comprising:

(a) forming a ball on an end of a bonding wire, projecting from the tip of a bonding capillary, by electric discharge between the end of the wire and an electrode, in a reducing gas atmosphere including at least hydrogen, the hydrogen being contained in the gas atmosphere in an amount smaller than 4% by volume, the gas atmosphere having a temperature of at least 100° C., but lower than a temperature at which the wire sticks to the bonding capillary, the gas atmoshpere, at the gas atmosphere temperature, being supplied through nozzles directed at the end of wire, the gas atmosphere being maintained at said temperature at least while the ball is being hardened, so as to provide a softened ball as compared to the hardness of a ball formed in a gas atmosphere at lower temperatures, the wire being made of copper; and

(b) ball-bonding the wire to the pad through the ball with the capillary, by pushing the ball against the major surface of the pad vertically while the ball is projected from the tip of the capillary, whereby, due to said softened ball, cracking during ball-bonding is avoided while a predetermined bonding area is achieved.

4,976,394

TWO-PART CARTON WITH CARRYING HANDLE

Charles S. Rathbone, Waynesville, N.C., assignor to Champion International Corporation, Stamford, Conn.

Filed Apr. 11, 1990, Ser. No. 507,516

Int. Cl.[5] B65D *5/46, 5/32*

U.S. Cl. 229—117.14 **7 Claims**

1. A carton with a handle, comprising:

a cover member having a first side wall panel, first and second opposed end wall panels, a first top handle panel and a first base panel;

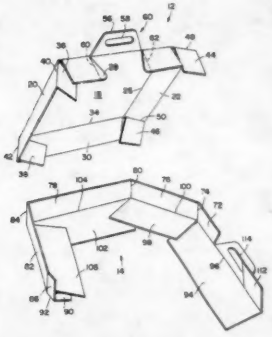
said first end wall panel including hingedly connected first opposing top and base corner flaps; said second end wall panel including hingedly connected second opposing top and base corner flaps; with said first base panel, and said first and second base corner flaps overlapping each other to form said cover member;

said first top handle panel being defined by first and second perforated score lines which extend substantially across the entire width of the first top panel from the first side wall panel to an outer edge of the top handle panel and a third enclosed score line whereby a first handle member is formed by severing said top handle panel along said two perforated score lines and at least partially severing said top panel along said third enclosed scoreline;

a body member having a second side wall panel including first and second side wall flaps, third and fourth opposed side wall panels, a second top handle panel and a second base panel;

said second side wall panel including said first side wall flap being hingedly connected to said second top handle panel and said second side wall flap being hingedly connected to said second base panel;

said second base panel being hingedly connected to and disposed between said third and fourth opposed side wall panels;



said third and fourth opposed side wall panels having third and fourth side wall flaps, respectively, hingedly connected thereto;

said fourth opposed side wall panel having a tab hingedly connected to one end;

with said first, second, third and fourth side wall flaps said tab and said second top handle panel overlapping each other to form said body member;

said second top handle panel being defined by fourth and fifth perforated score lines which extend across the entire width of the second top handle panel from the first side wall flap to an outer edge of the second top handle panel and a seventh enclosed score line whereby said second handle is formed by severing said second handle panel along said perforated score lines; and

said body member and said cover member cooperating with each other whereby when said body member is placed in said cover member said carton with a handle is formed.

4,976,395

HEAVIER-THAN-AIR DISK-TYPE AIRCRAFT

Joachim von Kozierowski, Zum Darloh 5, D-5982 Neuenrade 4, Fed. Rep. of Germany

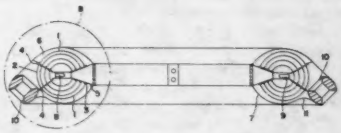
Filed Aug. 24, 1988, Ser. No. 235,592

Claims priority, application Fed. Rep. of Germany, Aug. 24, 1987, 3728153

Int. Cl.[5] **B64C** *39/06*

U.S. Cl. 244—12.2 **4 Claims**

1. Circular centrifugal transport ring comprising spaced blades located side-by-side relative to a center axis of said ring, each of said blades comprising a plurality of compressor blades (1) and a turbine blade (2), said blades being connected to each other through at least one separator ring (4) to form a circular ring shell with bearing rings, other circular ring shells being arranged concentrically with adjacent circular ring shells without contact, above each other or inside each other, an energy aggregate being housed in an innermost one of said circular ring shells, said energy aggregate inducing a relatively or absolutely opposite rotation of the circular ring shells, so



that the surrounding medium is taken in by the circular ring shells, accelerated and expelled through guide means, whereby the housing of the centrifugal ring itself is held rotationally stable with respect to the center axis and a torus-like body is formed for receiving in a center thereof interchangeable transport cabins hooked thereinto.

4,976,396

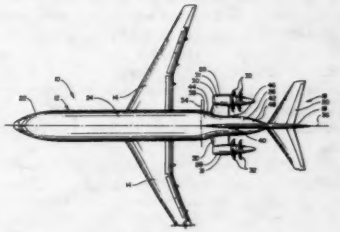
AIRCRAFT CONFIGURATION WITH AFT MOUNTED ENGINES

Robert B. Carlson, Tukwila; Barbara J. Cosgrove, Kirkland, and Paul T. Meredith, Renton, all of Wash., assignors to The Boeing Company, Seattle, Wash.

Filed Nov. 13, 1987, Ser. No. 120,637

Int. Cl.[5] **B64C** *1/16*

U.S. Cl. 244—55 **41 Claims**



1. An aircraft comprising:

(a) a fuselage having a longitudinal center axis, a forward portion, an intermediate main portion, and a rear portion, said rear portion comprising a forward section, a rear section with an end closure location, and an intermediate section,

(b) first and second engines mounted adjacent to an exterior surface of said rear section, said engines having first and second enclosed propeller means at first and second propeller locations, said propeller means being arranged to rotate about first and second propeller axes, respectively, with each propeller axis having a substantial alignment component parallel to said longitudinal axis,

(c) the rear portion of the fuselage having first and second exterior, longitudinally extending surface portions, said first surface portion having a first forward surface region extending longitudinally along said forward section, a first intermediate surface region extending along said intermediate section adjacent to said first propeller means, and a first rear surface region extending along said rear section, said second surface portion having a second forward surface region extending longitudinally along said forward section, a second intermediate surface region extending along said intermediate section adjacent to said

second propeller means, and a second rear surface region extending along said rear section,

(d) said rear fuselage portion being characterized in that the forward region of each surface portion slants rearwardly and inwardly toward said longitudinal center axis at a relatively greater inward and rearward slant relative to said longitudinal axis and curves concavely to join to its related intermediate region which has less inward and rearward slant with respect to said longitudinal center axis relative to its related forward surface region, each intermediate region joining to its related rear region in a convex curve with each rear region slanting rearwardly and inwardly to said closure location.

4,976,397

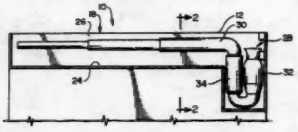
ANTI-ICING SYSTEM FOR AIRCRAFT

Peter K. C. Rudolph, Seattle, Wash., and Douglas L. Bader, Phoenix, Ariz., assignors to The Boeing Company, Seattle, Wash.

Continuation-in-part of Ser. No. 687,586, Dec. 31, 1984, Pat. No. 4,741,499. This application Apr. 27, 1988, Ser. No. 186,952

Int. Cl.[5] B64D *15/04*

U.S. Cl. 244—134 B **32 Claims**



25. A deicing system for an aircraft structure which has a surface member having an exposed surface area upon which ice tends to collect, and which defines an enclosed chamber adjacent thereto, said system comprising:

a. a hot air distribution tube means having n inlet portion, said tube means being positioned to said chamber and having outlets to discharge hot air into said chamber so as to be in heat exchange relationship with said surface member,

b. a compressor means having an inlet to receive air from said chamber and to compress said air to cause a rise in temperature of said air sufficient to accomplish deicing, and then move said air to the inlet portion of the tube means, with energy imparted to said air by compression thereof contributing substantially to increase of temperature of said air to a level sufficiently high to accomplish deicing,

c. power supply and control means adapted to selectively supply power to, and cause operation of, said compressor means to cause heated air to be directed through said distribution tube means and in heat exchange relationship with the surface member,

d. said aircraft structure comprising a leading edge structure, and said system comprising a modular system which can be inserted in, and removed from, said leading edge structure.

4,976,398

FUEL TANK FOR AGGRESSIVE LIQUID FUELS

Hansdieter Bruhn, Bremen, Fed. Rep. of Germany, assignor to Erno Raumfahrttechnik GmbH, Bremen, Fed. Rep. of Germany

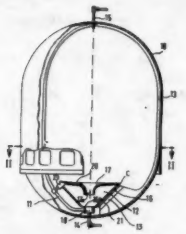
Filed Oct. 24, 1989, Ser. No. 426,798

Claims priority, application Fed. Rep. of Germany, Nov. 2, 1988, 3837137

Int. Cl.[5] B64D *37/00*

U.S. Cl. 244—135 R **5 Claims**

1. A fuel tank for storing agressive liquid fuels, especially fuels for operating satellite engines, comprising connector means for filling said tank with fuel and for removing fuel from said tank, a collecting means inside said tank, guide vanes inside said tank, said connector means cooperating with said collecting means and with said guide vanes for enabling pumping fuel in a bubble-free manner under zero-gravity operating conditions, said collecting means (12) comprising a container open at both ends and having conical container defining walls (16, 17) which are connected to each other at-their larger diameters, said conical walls having small diameter ends defining openings (16*a*, 17*a*), a collecting vessel (18), one of said



openings (16*a*) being arranged immediately next to said collecting vessel (18) for feeding fuel through said one opening into said collecting vessel (18), a conduit communicating said collecting vessel (18) with said connector means for removing fuel from said tank, further collecting vessels (19) secured to said container defining conical walls in a zone of said larger diameters of said conical walls (16, 17), and pipe means (11) for connecting said first mentioned collecting vessel (18) with said further collecting vessels (19).

4,976,399

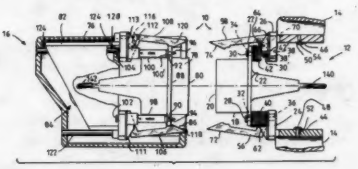
SPACECRAFT CONNECTOR

Peter M. Bay, Germantown; Carmine J. Colaluca, Jr., Derwood, and Steven Pataki, Silver Spring, all of Md., assignors to Fairchild Space and Defense Corporation, Germantown, Md.

Filed Jan. 26, 1989, Ser. No. 301,931

Int. Cl.[5] B64G *1/64*

U.S. Cl. 244—161 **9 Claims**



1. Spacecraft connecting apparatus for connecting and disconnecting a removable connecting member to and from a spacecraft comprising a first connector portion located on a spacecraft and a second connector portion locatable externally from said spacecraft, said first connector portion comprising an on board connecting member, at least a pair of separated rotatably mounted clamp members and means operatively associated with said clamp members for biasing said clamp members toward each other, said second connector portion comprising a removable connecting member, securing means associated with said removable connecting member for use in securing said removable connecting member in its connected or disconnected position, at least a pair of rotatably mounted second connector portion clamp members, means operatively associated with said second connector portion clamp members for biasing said second connector portion clamp members toward each other and means operatively connected to said removable connecting member for moving said removable connecting

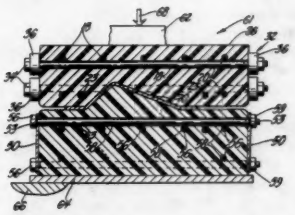
member toward the on board connecting member of said first connector portion, said first connector portion clamp members and said second connector portion clamp members having outer end portions sized and shaped to engage the securing means associated with said removable connecting member and to be disengaged from the securing means by engagement with the end portions of the clamp members of the other connector portion when said removable connecting member is moved toward the on board connecting member of said first connector portion by said means for moving said removable connecting member.

4,976,400

PLASTIC TOOLING WITH COMPRESSION ADJUSTMENT

William A. Martell, Sterling Heights; Ladislaus Weiss, Clawson; Robert P. VanJaarsveld, Sterling Heights, all of Mich., and Colin R. Brown, Grange, Australia, assignors to General Motors Corporation, Detroit, Mich.

Filed Jun. 16, 1989, Ser. No. 367,000
Int. Cl.[5] B29C *33/40, 43/02;* B30B *9/00*
U.S. Cl. 249—134 **5 Claims**



1. A tool for use in conditions producing high tensile stress loads therein comprising in combination: a tool body of plastics material having opposing sides, compression means operatively associated with said tool body for contacting each of said opposing sides of said tool body and for supporting and compressively loading said body and load imparting means associated with said compression means for selectively adjusting said compression means towards one another for increasing the compression loads on said body so that said body withstands internal high stress loads when working under high load conditions and for relieving said compression means from said body when said tool is inactive.

4,976,401

ADJUSTABLE CORNER SQUARING STRIP FOR A CONCRETE COLUMN FORM

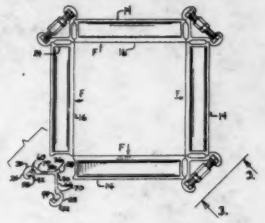
Michael G. Carlson, Lenexa, Kans., assignor to Western Forms, Inc., Kansas City, Mo.

Filed Feb. 7, 1989, Ser. No. 307,896
The portion of the term of this patent subsequent to Dec. 18, 2007, has been disclaimed.
Int. Cl.[5] E04G *13/02*
U.S. Cl. 249—194 **20 Claims**

1. An adjustable corner strip for connection to adjacent side rails of angularly related form panels comprising:

(a) respective flange means diverging angularly from a juncture and forming flexible resilient spaced wings, each said wing for connection to respective said rails of adjoining concrete form panels; and

(b) adjustment means extending between said flange means for adjusting the angular divergence of said flange means



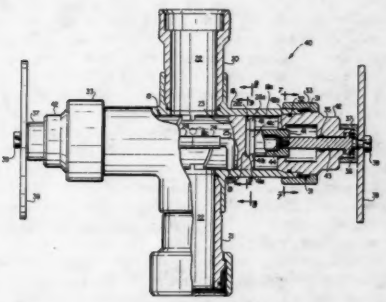
from said juncture, and thereby adjusting the angular relationship of said concrete form panels.

4,976,402

MANUAL BLOWOUT PREVENTER WITH INVERTIBLE RAMS

Glenn R. Davis, Euless, Tex., assignor to Otis Engineering Corporation, Dallas, Tex.

Division of Ser. No. 415,968, Oct. 2, 1989. This application May 21, 1990, Ser. No. 526,443
Int. Cl.[5] E21B *33/06*
U.S. Cl. 251—1.3 **6 Claims**



1. A blowout preventer comprising:

(a) a body having a passageway for line therethrough, said body also having opposed bores intersecting said passageway;

(b) invertible end bodies closing each bore;

(c) means for positioning said end bodies upright or inverted;

(d) a ram having an inner seal mounted in each bore;

(e) means for keying said rams to said end bodies including, an opening in the outer end of each ram, said opening having parallel flat surfaces on opposed sides and an inner groove, said groove having opposed parallel flat surfaces parallel with said opening flat surfaces;

a square sleeve, slidably mounted in a square hole in each end body, said sleeve having a groove with parallel flat surfaces on opposed sides of said groove near the inner end of said sleeve, said square sleeve groove flat surfaces engageable with said ram opening flat surfaces; and

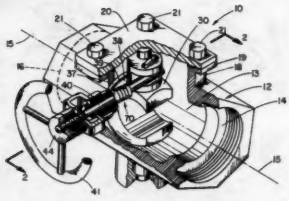
(f) means for moving each ram between open position not sealing and closed position where said inner ram seals seal on each other and around any line in said body passageway and close said passageway to flow.

4,976,403

VALVE WITH METALLIC BELLOWS VALVE STEM SEAL

John W. Bramblet, Houston, Tex., assignor to Rockford Controls Corporation, Houston, Tex.

Filed Jan. 16, 1990, Ser. No. 465,492
Int. Cl.[5] F16K *31/50, 31/528, 31/54, 41/10*
U.S. Cl. 251—214 4 Claims



1. A valve comprising a valve body having a valve chamber formed therein and an inlet port and an outlet port provided in the valve body in communication with said valve chamber and defining therewith a flow passage through the valve body;

a valve element rotatively mounted in the valve body within said valve chamber for rotative movement about a first axis between a first position wherein said flow passage is open and a second position wherein said valve element closes said flow passage, said valve element being provided with a closure portion and trunnions on either side of said closure portion, said trunnions being aligned with said first axis and rotatively journalled in said valve body for accommodating rotary movement of said valve element about said first axis;

said valve body having a valve stem bore formed in the valve body in communication with said valve chamber and extending along a second axis disposed transverse to and offset with respect to said first axis;

a valve stem extending through said valve stem bore and arranged for axial linear motion in said valve chamber;

means for interconnecting said valve stem to one of said trunnions in said valve chamber whereby axial linear movement of said valve stem imparts rotary movement to said valve element for rotation between said first and second positions;

said means for interconnecting the valve stem to the valve element comprising a connection wherein one of said trunnions is provided with an elongate slot having side walls formed therein to extend in a direction transverse with respect to said trunnion journal axis, said valve stem being provided with a drive which projects therefrom in a direction transverse to the axis of the valve stem and is received within said elongate slot in driving engagement with a side wall of said slot whereby axial linear movement of the valve stem causes the drive to apply a moment force to the slotted trunnion about the journal axis and thereby impart rotary movement to said valve element in a direction to close or open said flow passage as controlled by the direction of axial linear movement of the valve stem;

actuator means on said valve body for imparting axial linear motion to said valve stem in a selected direction of axial movement in said valve chamber to either open or close said flow passage; and

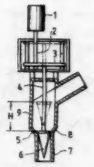
gas-tight seal means within said valve chamber for sealing the annulus formed in the valve stem bore between said valve stem and said valve body at said slotted trunnion, said seal means including a tubular metallic bellows disposed in sleeved relationship to said valve stem and connected at one end to said valve stem by an annular weld to effect a gas-tight connection therewith and connected at its other end in a welded relationship to said valve body and in encircling relation to said valve stem, said bellows being axially extensible in response to linear axial movement of the valve stem in one direction and being axially compressible in response to linear axial movement of the valve stem in the opposite direction.

4,976,404

FLOW CONTROL VALVE

Yasunori Ichikawa; Shigeru Yamaguchi; Hiroshi Ohnishi; Akira Kojima, and Akira Kato, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Aug. 1, 1988, Ser. No. 226,907
Claims priority, application Japan, Jul. 30, 1987, 62-188734
Int. Cl.[5] F16K *1/38, 31/04*
U.S. Cl. 251—121 9 Claims



1. A flow control valve comprising:

an electric motor;

a feed screw mechanism and coupling plate for converting a rotational output of said motor into linear motion;

a valve shaft coupled to said coupling plate, said valve shaft being moved vertically as said coupling plate is moved;

a valve casing comprising an inlet-side casing and an outlet-side casing, a valve seat being defined by a lower end portion of said inlet side casing, said inlet-side casing and an outlet-side casing, a valve shaft, said outlet-side casing merging with said inlet-side casing;

a valve body fixed to a lower end of said valve shaft, said valve body comprising a circular-truncated-cone-shaped working face extending downward from said valve shaft and tapered towards an outlet of said valve, and a valve head extending downward from said working face, said working face being seated against said valve seat and said valve head being positioned in said outlet-side casing when said valve is fully closed, said valve head being shaped with respect to a valve opening area between a surface of said valve head and said valve seat so that a rate of change of flow rate with valve stroke is small and linear, said valve head being positioned within said inlet-side casing when said valve is fully open.

4,976,405

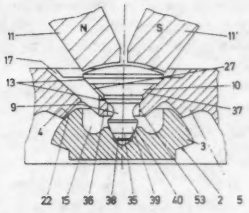
ELECTROMAGNETICALLY ACTUATABLE VALVE

Juergen Graner, Ludwigsburg; Marcel Kirchner, Stuttgart, and Hans Kubach, Korntal-Muenchingen, all of Fed. Rep. of Germany, assignors to Robert Bosch GmbH, Stuttgart, Fed. Rep. of Germany

Filed Feb. 28, 1990, Ser. No. 485,906
Claims priority, application Fed. Rep. of Germany, Mar. 25, 1989, 3909893
Int. Cl.[5] F16K *31/06;* B05B *1/32*
U.S. Cl. 251—129.16 4 Claims

1. An electromagnetically actuatable valve, in particular a fuel injection valve for fuel injection systems of internal combustion engines, having a core (11, 11') and an armature (10) of soft magnetic material arranged to actuate a valve element (2) adapted to cooperate with a fixed valve seat (4), said valve element (2) provided with a sealing element (3) movable outwardly for opening the valve, said armature (10) being connected to the valve element (2) by a connecting part (9), said connecting part (9) being arranged to protrude through a flow

bore (53) of a valve seat body (5), said valve seat body (5) further having a frustoconical bearing cone (27) machined therein a length of a surface line of which is approximately



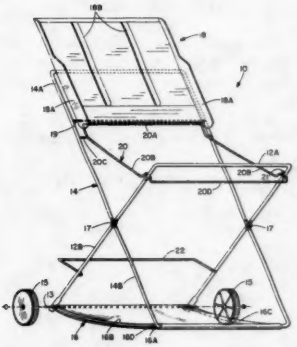
equivalent to a mean diameter thereof, and said armature (10), on its side remote from the core (11, 11'), has a frustoconical surface adapted to engage a majority of a surface portion of the bearing cone.

4,976,406

UTILITY STAND

Clifford J. Buckley, and Steven R. Pfister, both of Fort Collins, Colo., assignors to BPP Corporation, Fort Collins, Colo.

Filed Oct. 10, 1989, Ser. No. 430,819
Int. Cl.[5] B62B *3/02*
U.S. Cl. 280—641 **18 Claims**



1. A portable, self-supporting, collapsible utility stand for supporting a trash bag or the like in an upright open position for the deposit of material into said bag; wherein said bag includes an open end and a closed end; said utility stand comprising:

(a) a first U-shaped frame member having upper and lower ends; wherein said upper end includes handle means;

(b) a second U-shaped frame member having upper and lower ends; wherein said second frame member is pivotably connected intermediate its said ends to said first frame member;

(c) wheel members rotatably supported at said lower end of one of said frame members;

(d) bag holding and tensioning means carried by said frame members; wherein said bag can be supported in an upright open position by said bag holding and tensioning means; wherein said holding an tensioning means comprises at least one arm extending between said first and second frame members to hold the upper ends of said frame members apart;

(e) flexible bag support means extending between said lower ends of said first and second frame members for supporting the closed end of said bag;

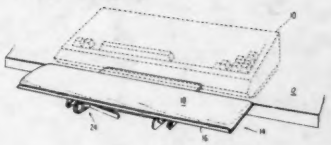
wherein said frame members are pivotable with respect to each other between open and closed positions.

4,976,407

ADJUSTABLE WRIST SUPPORT

Edward M. Schwartz, Kansas City, and Wilburn D. Everman, Belton, both of Mo., assignors to Edtech Company, Kansas City, Mo.

Filed Dec. 13, 1989, Ser. No. 450,146
Int. Cl.[5] B43L *15/00*
U.S. Cl. 248—118.3 **7 Claims**



1. A support for supporting the wrist of a typist or VDT operator during operation of a keyboard, said support comprising:

wrist support means for supporting said operator's wrist;

mounting means for mounting said wrist support means to a base which is adapted to support said keyboard, such that said wrist support means is disposed in front of said keyboard; and

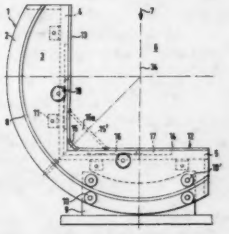
articulating means connecting said wrist support means to said mounting means for allowing three-directional independent adjustability of said wrist support means, such that said wrist support is independently and/or simultaneously adjustable in both a horizontal and a vertical direction and is also pivotably adjustable.

4,976,408

DEVICE FOR MICROFILMING BOUND VOLUMES USING A TILTABLE BOOK CRADLE

Ernst Hertlein, and Anselm Herrmann, both of Garmisch-Partenkirchen, Fed. Rep. of Germany, assignors to Hermann & Kraemer GmbH & Co. K.G., Garmisch-Partenkirchen, Fed. Rep. of Germany

Filed May 26, 1989, Ser. No. 357,277
Claims priority, application Fed. Rep. of Germany, Jun. 9, 1988, 3819576
Int. Cl.[5] G03G *15/00*
U.S. Cl. 248—446 **18 Claims**



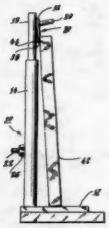
1. A device for photographing bound volumes comprising:

a support comprising two support walls standing perpendicular to one another for supporting a book cover and delimiting a work space on two sides;

at least one horizontal glass plate and means for moving

same operably associated therewith for sliding said plate glass into and out of said work space; said support including an arcuate cradle that is constructed and arranged to be rotatable through an arc at least 90° and so that said glass plate can be slid into and out of said work space by said means for moving; and transverse guide means for pressing a page to be photographed against the bottom surface of said glass plate, said cradle being rotatable relative to said guide means.

4,976,409
ADJUSTABLE PICTURE HANGER
Willy Hansen, 23 Echo La., Warwick, N.Y. 10990
Filed Mar. 12, 1990, Ser. No. 492,537
Int. Cl.[5] A47G *1/00*
U.S. Cl. 248—469 **2 Claims**



1. An adjustable picture stand and hanger having a height adjustment range for mounting a picture frame within a predetermined size range on said picture stand comprising:

a pedestal;

a tubular sleeve vertically mounted on said pedestal, said sleeve having an open slot extending vertically from an end of said sleeve remote from said pedestal along a substantial length of said sleeve;

a pole having first and second ends thereon, said pole being mounted for vertical movement in said sleeve and having a peg mounted near said first end of said pole extending outwardly extending at an upward angle from and above said pedestal and adapted to have a hanger of a picture frame positioned thereon which frame rests on said pedestal;

a screw anchored near the second end of said pole and being positioned for slideable movement in said slot of said sleeve;

a nut mounted on said screw for holding said pole in a fixed position in said slot when tightened therein when the desired height of said pole is provided and for adjusting the height of said pole in said sleeve when said nut is loosened, and

having a picture frame mounted thereon, a hanger mounted on the top of said frame positioned on said peg and having the bottom of the frame resting on said pedestal.

4,976,410
VEHICLE LOCATOR
Theodore Tomaiuolo, 114 Bohemia St., Plainville, Conn. 06062
Filed Dec. 5, 1989, Ser. No. 446,477
Int. Cl.[5] G09F *17/00*
U.S. Cl. 248—514 **11 Claims**

1. An adjustable signal device comprising:

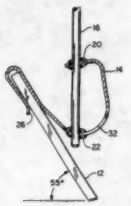
mounting bracket means, said bracket means having first and second oppositely disposed and spacially displaced ends, said bracket means including:

retaining means for affixing said first end of said bracket means to an object;

a first flagstaff receiving aperture in said bracket means adjacent the said second end thereof; and

an elongated slot in said bracket means intermediate said first and second ends thereof, said slot being at least in part in registration with said aperture whereby a flagstaff may simultaneously extend through said aperture and slot;

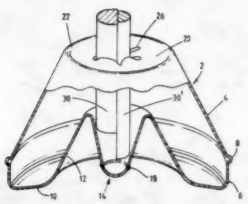
a first grommet installed in said first aperture, said first grommet being comprised of a resilient material and being sized relative to the said aperture hole so as to be in compression;



a second grommet installed in said slot, said second grommet being sized relative to said slot so as to be in compression, said second grommet being slidable along said slot; and

a flagstaff extending through said first and second grommets and being securely engaged thereby, said flagstaff pivoting about its region of engagement by said first grommet when said second grommet slides along said slot.

4,976,411
CHRISTMAS TREE STAND
Ian A. Gordon, 34 Colville Street, Carlisle, Cumbria CA2 5HT, and Howard J. Foster, 12 London Road Terrace, Carlisle, Cumbria Ca1 2PF, both of England
Filed Nov. 2, 1989, Ser. No. 430,368
Claims priority, application United Kingdom, Nov. 11, 1988, 8826435
Int. Cl.[5] F16M *13/00*
U.S. Cl. 248—524 **8 Claims**



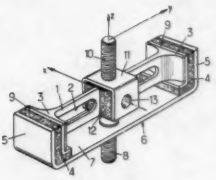
1. A Christmas tree stand comprising a lower, upwardly-open, downwardly-tapering socket for receiving therein the lower end of the truck of the tree, an outer wall surrounding the socket and a transverse top wall of a resilient plastics material capping said outer wall, the top wall defining therethrough a substantially circular central aperture overlying the socket and of a diameter substantially equal to that of the smallest trunk to be received within the stand, and a plurality of substantially radial slots formed in said top wall and each having a width in the plane of the top wall, the slots defining between them a plurality of leaves each of which generally truncated sector shape, the leaves having side edges thereto, the side edges of adjacent leaves being spaced from one another by the width of a slot, the leaves being resiliently yieldable on the downward insertion therethrough and the upward withdrawal therefrom of the trunk.

4,976,412

RESILIENT SUPPORT WITH ANISOTROPIC STIFFNESSES PARTICULARLY FOR BODYWORK SUSPENSIONS

Jean-Michel Simon, Clamart; Jacques Taniere, Chateaudun; Jean-Pierre Ciolczyk, Montargis, and Michel Domer, Valdampierre, all of France, assignors to Hutchinson, France

Filed Nov. 6, 1989, Ser. No. 432,080
Claims priority, application France, Nov. 9, 1988, 88 14638
Int. Cl.[5] F16M *13/00*
U.S. Cl. 248—634 13 Claims



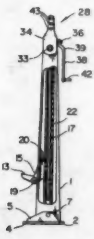
1. Resilient support with anisotropic stiffnesses, particularly for bodywork suspensions, this support comprising on the one hand a main resilient element for supporting the load and having different stiffnesses along its three orthogonal axes, and particularly a stiffness in the transverse direction (y axis) of one or more orders of size greater than the stiffness in the longitudinal direction (x axis), the stiffness in the direction of the main load (or vertical direction, z axis) being intermediate between the two preceding ones, and on the other hand means for fixing this resilient element respectively to two assemblies between which the support is to be inserted, characterized in that the support comprises as a main resilient element at least one beam (1) extending in said transverse direction (y), the ends (3) of this beam (1) being secured to a first frame (6) adapted to be fixed to one of said assemblies and the median part of the beam being secured to a second frame (11) adapted to be fixed to the other assembly, and in that the cross section of this beam (1) has a shape such that at the level of said second frame (11) it has the desired stiffnesses, respectively in the longitudinal direction (x axis) and in the direction of the main load (z axis).

4,976,413

MECHANICAL JACKING DEVICE

Navarre A. Massey, Box 1299, Fort Macleod, Alberta, Canada T0L 0Z0

Filed Nov. 28, 1989, Ser. No. 442,002
Int. Cl.[5] F16H *29/02*
U.S. Cl. 254—95 5 Claims



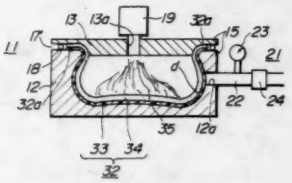
1. A jack for a vehicle or another heavy load comprising elongated casing means; slot means extending longitudinally of one wall of said casing means; panel means slidable in said slot means between the ends thereof; support arm means extending outwardly from said panel means for supporting a load; roller means on said panel means and on said support arm means movably supporting said panel means in said casing means for vertical movement in said slot means; endless chain means in said casing means engaging said panel means for moving the panel means and said support arm means in said slot means; and slack adjuster means on said casing means for driving said chain means, whereby in use, the support arm means can be moved vertically in said slot means between raised and lowered positions.

4,976,414

METHOD OF PRODUCING SKIN-COVERED FOAMED PLASTIC ARTICLE

Norio Yanagishita, Ayase, Japan, assignor to Ikeda Bussan Co., Ltd., Ayase, Japan

Filed Oct. 20, 1988, Ser. No. 260,420
Claims priority, application Japan, Oct. 31, 1987, 62-276812
The portion of the term of this patent subsequent to Sep. 25, 2007, has been disclaimed.
Int. Cl.[5] B29C *67/22*
U.S. Cl. 264—40.3 4 Claims



1. A method of producing a skin-covered foamed plastic article, comprising:

(a) preparing a lower mold which has a cavity formed therein;

(b) putting a bag-shaped outer skin member into said cavity, said skin member having a porous inner layer;

(c) sealingly closing said cavity;

(d) pouring a foamable material for the foamed plastic article into the bag-shaped outer skin member, said material being capable of impregnating a portion of said inner layer, said material foaming in said cavity and causing pressure in said cavity to gradually increase;

(e) curing said material to provide said article; and

(f) activating pressure control means when said pressure increases to a predetermined value and thereby adjusting said pressure such that said curing is carried out under a certain pressure which will provide said inner layer with a material-impregnated part of a desired thickness therethroughout.

4,976,415

DAMPING SUPPORT STRUCTURE

Nobuyoshi Murai, Sakai; Yoshinori Takahashi, Tondabayashi, and Kazuyoshi Katayama, Nishinomiya, all of Japan, assignors to Takenaka Corporation, A Japanese Corporation, Osaka, Japan

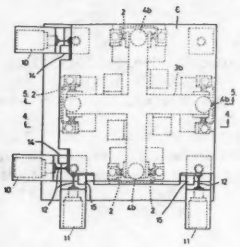
Filed Jun. 1, 1989, Ser. No. 360,238
Claims priority, application Japan, Jun. 6, 1988, 63-140286; Jun. 6, 1988, 63-140287; Jun. 6, 1988, 63-140288; Jun. 6, 1988, 63-140289
Int. Cl.[5] F16F *7/10*
U.S. Cl. 267—136 5 Claims

1. A damping support structure having a stationary member, an apparatus table, and air springs disposed between the stationary member and the apparatus table for elastically supporting the apparatus table, said damping support structure comprising;

a support deck supported in suspension by said stationary member to be horizontally displaceable, said support deck

supporting said apparatus table through said air springs arranged in a plurality of stages,

linear motors operatively interconnecting said stationary member and said support deck, said linear motors being operable in three-dimensional directions including two horizontal directions perpendicular to each other and a vertical direction,



vibration sensors connected to said apparatus table, and

control means for deriving displacement and velocity signals from detection results received from said vibration sensors, and calculating control signals from the displacement and velocity signals for application to said linear motors.

4,976,416

PRESSURE SPRING TENSIONER

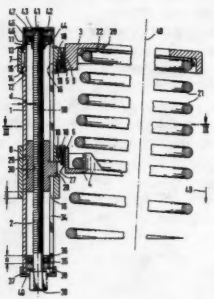
Horst Klann, Terra Wohnpark 12, D-7730 Villingen-Schwenningen 24, Fed. Rep. of Germany

Filed Jun. 1, 1989, Ser. No. 359,519

Claims priority, application Fed. Rep. of Germany, Jul. 7, 1988, 3823041

Int. Cl.[5] F16F *1/06;* **B25B** *27/26;* **B23P** *19/04*

U.S. Cl. 267—177 **9 Claims**



1. A pressure spring tensioner, comprising a cylindrical guiding tube having an axially elongated tube slot, formed in a guiding tube wall having a guiding tube wall thickness a threaded spindle extending axially within and rotatably mounted in said tube, a first sleeve affixed to said tube adjacent one end thereof, a first gripping clamp carried by said first sleeve and engageable with a first end of the spring, a second sleeve assembly, a second gripping clamp carried by said second sleeve assembly, said second sleeve assembly including a second sleeve slidable on said guiding tube with a sliding snug fit, and having a radial recess, a pad in said second sleeve in threaded engagement with said threaded spindle and having a radial finger extending through said radial recess of said sleeve, said finger being of a length no longer than twice the thickness of said guiding tube wall and being engageable in said axially elongated tube slot so that rotation of said spindle advances said pad with said second sleeve and said second clamp to engage the spring opposite the spring first end.

4,976,417

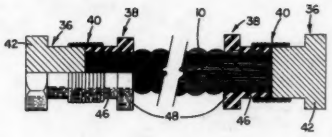
WRAP SPRING END ATTACHMENT ASSEMBLY FOR A TWISTED ROPE TORSION BAR

Jack E. Smith, Dayton, Ohio, assignor to General Motors Corporation, Detroit, Mich.

Filed Aug. 14, 1989, Ser. No. 393,182

Int. Cl.[5] B60G *11/34, 11/18;* **F16F** *1/06, 1/14*

U.S. Cl. 267—25 **3 Claims**



1. An end attachment assembly for a twisted rope torsion bar, comprising:

anchor means for connection to a mounting means of a sprung mass;

means for receiving said twisted rope torsion bar including an attachment interface; and

spring means engaging said anchor means and said receiving means, said spring means positively responding to applied torque so as to constrict around said anchor means and said receiving means, whereby secure engagement is continuously maintained between said anchor means and said twisted rope torsion bar to reduce the stress concentration at the attachment interface, and separation of said attachment assembly from said torsion bar is prevented.

4,976,418

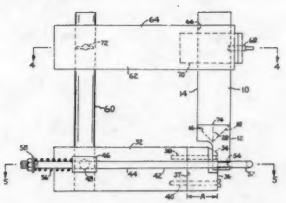
BORING BAR-CUTTER HEAD FIXTURE

Terry L. Harville, 414 Albany Ave., Deland, Fla. 32724

Filed Nov. 16, 1989, Ser. No. 437,349

Int. Cl.[5] B25B *1/20*

U.S. Cl. 269—43 **9 Claims**



1. A brazing fixture for positioning a boring bar and cutter head together so that the bar is located directly above the bar, with the bar axis and head axis in vertical alignment; said fixture comprising a base having a seat element projecting laterally therefrom to fit into a tool-reception pocket in the cutter head, a retainer slidably mounted on the base for motion generally normal to the cutter head axis, said retainer having a tip movable toward or away from the sea element, whereby the cutter head is held between the seat element and retainer tip, and a spring means **(56)** operatively trained between the base and retainer for biasing said retainer toward said seat element so that the retainer tip has pressure engagement with the cutter head; and a clamp means located above the base for holding a boring bar in a vertical position; said clamp means

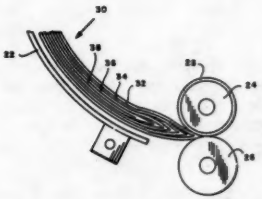
having a vertical reference surface oriented to said seat element so that the bar has its axis in vertical alignment with the cutter head axis, and a bar gripper component movable toward said reference surface to hold the bar thereagainst.

4,976,419

BUCKLE CHUTE FOLDER EXIT ROLLERS

Robert J. Bartoes, Lagrangeville, N.Y., and Eugene A. Wirth, Huntington, Conn., assignors to Pitney Bowes Inc., Stamford, Conn.

Filed Feb. 23, 1989, Ser. No. 315,622
Int. Cl.[5] B42C *1/00*
U.S. Cl. 270—45 **4 Claims**



1. A buckle chute folder for folding a plurality of paper sheets, comprising:

a buckle chute;

a pair of folding rollers downstream of said buckle chute;

a curved paper guide downstream and adjacent said folding rollers for changing the direction of the folded sheets as they exit said folding rollers; and

a pair of exit rollers downstream of said paper guide, one of said exit rollers having a fluorinated ethylene propylene sleeve whereby neither of said exit rollers feeds a paper sheet forming a part of said plurality of paper sheets ahead of any other of the paper sheets forming said plurality of paper sheets.

4,976,420

METHOD FOR GATHERING SIGNATURES AND A GATHERING MACHINE FOR WORKING THE METHOD

Carl G. A. Flensburg, Grevegatan 31, Malmö, Sweden S-216 17, and Rolf H. V. Isaksson, Diakongatan 59, Malmö, Sweden S-216 23

PCT No. PCT/SE87/00196, § 371 Date Dec. 16, 1988, § 102(e) Date Dec. 16, 1988, PCT Pub. No. WO87/06217, PCT Pub. Date Oct. 22, 1987
PCT Filed Apr. 14, 1987, Ser. No. 288,257
Claims priority, application Sweden, Apr. 18, 1986, 8601784
Int. Cl.[5] B65H *39/02*
U.S. Cl. 270—54 **6 Claims**

1. A method of gathering signatures comprising the steps of:

feeding a plurality of signatures, lying face to face in a stack with each signature in said stack standing on a back edge thereof, to a delivery position with a face of a leading signature in said stack engaging an abutment,

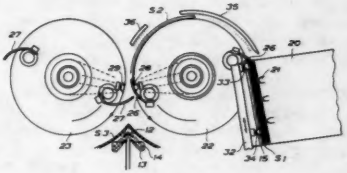
displacing said leading signature engaging said abutment in a direction transverse to said stack so as to project an edge of said leading signature which is opposite to said back edge above said stack,

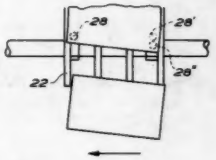
gripping said projecting edge of said leading signature,

extracting said gripped signature from said stack and carrying it away from said delivery position by a continuous movement in an unchanged moving direction,

turning said signature upside-down during said continuous movement,

angling said signature during said extracting and turning movement, and





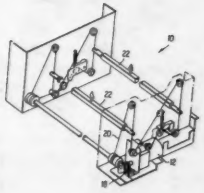
depositing said signature straddlewise on a conveyer path with one end of said signature leading.

4,976,421

PAPER FEED CONTROL DEVICE FOR COPIER WHICH DETERMINES THE ACTUAL NUMBER OF SHEETS REMAINING

Koichi Kanaya, Tokyo, Japan, assignor to Ricoh Company, Ltd., Tokyo, Japan

Continuation of Ser. No. 174,373, Mar. 28, 1988, abandoned, which is a division of Ser. No. 870,525, Jun. 4, 1986, abandoned. This application Oct. 2, 1989, Ser. No. 415,476
Claims priority, application Japan, Jun. 4, 1985, 60-119754; Jun. 14, 1985, 60-128060
Int. Cl.[5] B65H *7/14*
U.S. Cl. 271—258 **1 Claim**



1. A paper feed control device for controlling a paper feed level, or height, to a predetermined one by moving up and down a tray which is loaded with a stack of papers by a motor or the like where the papers are sequentially fed, comprising:

encoder means for generating pulses responsive to an amount of movement of the tray during each of upward and downward movements of the tray;

first counter means for counting papers which are sequentially fed from the tray;

second counter means for counting the encoder pulses which correspond to papers counted by said first counter;

means for entering an initial value in said second counter means until papers are fed from the tray;

decision means for calculating a relation between a number

of papers fed from the tray and the pulses generated by said encoder means; for subtracting a number determined by this relation from a number of pulses indicative of a full stack, thereby determining a number of pulses which must be generated before near-paper-end, and for comparing a number of pulses generated indicative of the paper feed level with the number indicating near-paper-end;

first non-volatile store means for storing the number of papers fed, the number of pulses generated by said encoder means and other data;

second store means storing a program for interrupting paper feed based on an output of said decision means; and

means for clearing the stored number of pulses generated by said encoder means in the first non-volatile store means in response to a detection that said tray is being loaded with said paper.

4,976,422

ARTIFICIAL SKI SLOPE

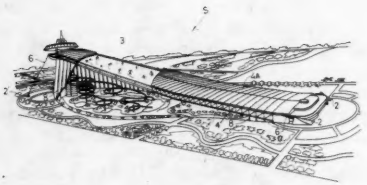
Eiji Shimamura, Tokyo, Japan, assignor to Kajima Corporation, Tokyo, Japan

Filed Dec. 8, 1989, Ser. No. 447,645

Claims priority, application Japan, Dec. 9, 1988, 63-311409

Int. Cl.[5] E04H *3/14*

U.S. Cl. 272—56.555 **26 Claims**



1. An artificial ski slope comprising: a tower; first anchor means positioned on one side and away from said tower substantially the length of a first ski slope; catenary suspension means secured at one end to the top of said tower and at the other end to said first anchor means; a ski slope platform; and means to suspend said ski slop platform from said catenary suspension means.

4,976,423

ROWING DEVICE

Jorma Routti, Lutherinkatu 2 B, 18, SF-00100 Helsinki, Finland

PCT No. PCT/FI87/00098, § 371 Date Jan. 25, 1989, § 102(e) Date Jan. 25, 1989, PCT Pub. No. WO88/00905, PCT Pub. Date Feb. 11, 1988

PCT Filed Jul. 22, 1987, Ser. No. 303,667

Claims priority, application Finland, Jul. 25, 1986, 863058

Int. Cl.[5] A63B *69/06*

U.S. Cl. 272—72 **2 Claims**

1. A rowing device convertible from an outdoor rowing frame for use in conjunction with a surf board, to an independent indoor exercising device, comprising

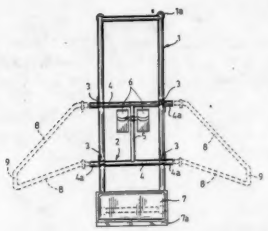
a framework forming a longitudinal track,

a fixed seat for a user, said seat being fastened to one end of the framework,

a foot support unit for the user's feet, said foot support unit comprising cross-tubes transverse to said longitudinal track and being moveable longitudinally along the track of the framework,

detachable rowlock supports detachably fastened to the foot support unit when the device is used for outdoor rowing together with the surf board,

means for interchangeably fastening to said device said rowlock supports and a combination of a pump cylinder and an oar lever, thereby enabling the device to be used as an independent indoor exercising device, said fastening means comprising locking elements disposed at ends of said cross-tubes for detachably locking said rowlock supports at the ends of said cross-tubes, said fastening means



further comprising lugs disposed intermediate the length of said cross-tubes for pivotally connecting the lower end of a pump cylinder and the lower end of an oar lever, and means for attaching the framework to a surf board.

4,976,424

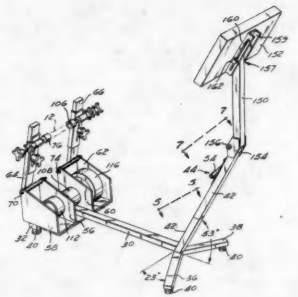
LOAD CONTROL FOR EXEXCISE DEVICE

Bruce A. Sargeant, Orange; Mark J. Hoffenberg, Laguna Niguel; Rob Reasons, Mission Viejo, and Robert A. Walpert, Montery Park, all of Calif., assignors to Schwinn Bicycle company, Chicago, Ill.

Division of Ser. No. 89,329, Aug. 25, 1987, which is a continuation-in-part of Ser. No. 54,749, May 26, 1987. This application Dec. 22, 1988, Ser. No. 290,317

Int. Cl.[5] A63B *23/04*

U.S. Cl. 272—73 **1 Claim**



1. An apparatus for controlling the loads exerted on a person exercising with an exercise device so as to control the heart rate of that person, comprising:

an exercise device which a person can use for cardiovascular exercises, the exercise device comprising:

a stationary frame for mounting components of a bicycle, said bicycle including a rear wheel, a rear tire and a rear axle, a frame, a seat, a front fork, handle bars and pedals, wherein said stationary frame comprises:

rear axle support mans for connecting to opposite ends of said rear axle without preventing rotation of said rear wheel and tire, said rear axle support means constraining said rear axle, wheel and tire to move along a predetermined path; and

fork support means for connecting to and supporting said front fork, said fork support means being movable in response to a shift in the weight of a rider;

a roller mounted to said frame so as to frictionally engage

said rear tire of the bicycle when said rear axle is connected to said rear axle support means, said roller and said rear axle support means cooperating to support said rear wheel and tire when said rear axle is connected to said rear axle support means so as to maintain frictional contact between said roller and said rear tire whose axle is connected to said rear support means, as the weight of a rider is shifted toward said fork support means, so as to prevent slippage between said roller and said rear tire; and

variable load means for exerting a variable resistance load to said roller which load can be resisted by said person to exercise and increase the person's cardiovascular rate;

decreased heart rate means operating when said person's heart rate is below a first predetermined lower limit in order to increase said heart rate, said decreased heart rate means determining whether the loads exerted by the variable load means just increased and if so whether said load has been unchanged for a predetermined period of time, said decreased heart rate means causing said variable load means to increase the load if the load is below a predetermined maximum value;

increased heart rate means operating when said person's heart rate is above a third predetermined limit in order to decrease said heart rate, said increased heart rate means determining whether the load exerted by said variable load means just increased, and if said load has been at an increased level for a predetermined time said increased heart rate means causes said variable loads means to increase the load, said increased heart rate means decreasing said load exerted by said variable load means if said load has not just decreased and if said load is not below a predetermined value;

increase heart rate shutdown means operating when said person's heart rate is more than a predetermined amount above a second, predetermined upper limit for greatly decreasing the load exerted by said variable load means; and

means for monitoring the heart rate of said person and communicating said heart rate to said increased and decreased heart rate means, and to said increased heart rate shutdown means.

4,976,425

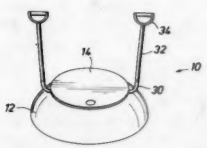
EXERCISE APPARATUS FEATURING TORSIONAL TWISTING MOTION IN A STATIONARY EXERCISE DEVICE

Gordon B. Barnes, Jr., 6411 Larkmount, Spring, Tex. 77389

Filed Jun. 22, 1989, Ser. No. 372,001

Int. Cl.[5] A63B *21/00*

U.S. Cl. 272—128 **18 Claims**



1. An exercise device which is used by reciprocating, repetitive strokes wherein the device comprises:

(a) a fixed base having a forward and rearward surface, and having an exposed upper area which permits the user to stand thereon said base having a vertical axis;

(b) a pair of elevated hand grips to enable a user in an upright posture to grasp said hand grips and apply forward and rearward reciprocating motion to said hand grips;

(c) a fly wheel rotatably mounted in said base for rotation about said vertical axis first in one direction and then in the opposite direction wherein fly wheel rotation absorbs energy; and

(d) means connecting said hand grips to said fly wheel wherein said connecting means transfers hand grip motion to said fly wheel to impart rotation thereto and the direction of motion is in a first direction and is subsequently reversed to the opposite direction under control by the user.

4,976,426

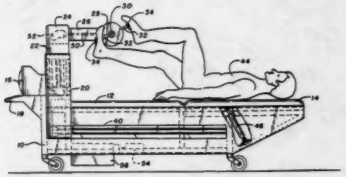
REHABILITATION EXERCISE DEVICE

Louis Szabo, deceased, late of Penticton (Edith Szabo, executrix); Gavril Morariu, Port Moody, and Eric W. Banister, West Vancouver, all of Canada, assignors to Garden Reach Developments Ltd., Penticton, Canada

Filed Sep. 6, 1989, Ser. No. 404,297

Int. Cl.[5] A63B *21/008*

U.S. Cl. 272—130 **11 Claims**



1. An exercise device for offering different levels of exercise for an individual, the device comprising:

an exercise head having at least one pair of crank arms for rotation of limbs of the individual about an axial shaft,

a hydraulic motor linked to the axial shaft to rotate the crank arms with hydraulic power source for the motor,

speed adjustment means in association with the hydraulic motor to set rotational speed of the axial shaft,

force adjustment means to adjust force applied to the limbs through the crank arms, to rotate the axial shaft beyond a set rotational speed,

speed sensing means to sense variation in the speed of the axial shaft,

force sensing means to sense variation in force applied to the crank arms by the limbs of the individual,

an elongate support table having a support arm extending from a column positioned at one side of the table to support the exercise head, the column slidably connected to the side of the support table to move backwards and forwards along the length of the table, and

a hydraulic means for positioning the support arm and adjusting the height of the exercise head above the table.

4,976,427

FRICTIONAL EXERCISER WITH TEMPERATURE INDICATING STRUCTURE

Anton Pantucek, Simmeringer Hauptstrasse 113/12, 1110 Wien, Austria

PCT No. PCT/EP87/00040, § 371 Date Aug. 18, 1988, § 102(e) Date Aug. 18, 1988, PCT Pub. No. WO87/04937, PCT Pub. Date Aug. 27, 1987

PCT Filed Jan. 29, 1987, Ser. No. 254,930

Claims priority, application Fed. Rep. of Germany, Feb. 20, 1986, 3605504; Austria, Feb. 24, 1986, 465/86

Int. Cl.[5] A63B *21/012*

U.S. Cl. 272—131 **8 Claims**

1. An exerciser comprising:

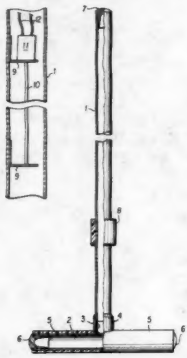
(a) arod having two ends;

(b) a T-piece mounted on one of said two ends of said rod, said T-piece having non-skid padded legs;

(c) a friction sleeve slidably mounted on said rod for reciprocal sliding motion on said rod when grasped by a user of the exerciser, which reciprocal sliding motion causes the temperature of said rod to increase; and

(d) means carried by said rod and in direct physical contact with said rod for giving a distinct signal when the temper-

ature of said rod due to said reciprocal sliding motion has increased by a predetermined amount, said means giving



no signal until the temperature of said rod due to said reciprocal sliding motion has increased by the predetermined amount.

4,976,428

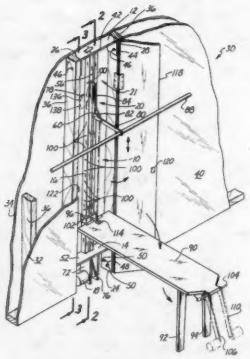
COMPACT WORKOUT APPARATUS

Mahmood M. Ghazi, 22482 Petra, Mission Viejo, Calif. 92692

Filed Oct. 11, 1989, Ser. No. 419,746

Int. Cl.[5] A63B *21/00*

U.S. Cl. 272—134 **21 Claims**



1. A workout apparatus for use in a building comprising:

a wall located in a building and including an external surface which partially defines a room in the building;

frame means at least partially in said wall, said frame means having a depth of less than about 12 inches, said external surface positioned to extend outwardly from said frame means; and

force means structured to provide a force against which an adult human can exercise at least one body part, said force means being sized and adapted to fit substantially entirely within said frame means when said force means is stored.

4,976,429

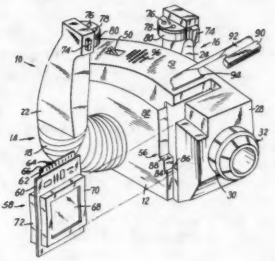
HAND-HELD VIDEO GAME IMAGE-PROJECTING AND CONTROL APPARATUS

Dietmar Nagel, 147 South Rd., Chester, N.J. 07930

Filed Dec. 7, 1988, Ser. No. 281,252

Int. Cl.[5] A63B *67/00*; A63P *9/22*

U.S. Cl. 273—1 E **17 Claims**



1. A display and control device for an interactive electronic video game module which includes a substantially transparent screen integral with the module and on which images associated with the game are operatively defined, said device comprising:

a housing including receptacle means defined in said housing for demountably receiving an interactive electronic video game module selectively insertable into and removable from said receptacle means by a user of said device;

projection means in said housing for projecting images operatively defined on the video game screen onto a remote display surface physically separate from and unconnected to said housing, said projection means comprising an illuminator and an opening in said housing, and said illuminator and said opening being located on opposite sides of said receptacle means so that, with the video game module mounted in said receptacle means, light from said illuminator projects through the substantially transparent screen and outwardly from the housing through said opening onto a remote display surface for ready viewing of the projected images by the user;

wherein said receptacle means comprises a channel defined in said housing between said illuminator and said opening and predeterminately configured for slidable releasable receipt of the video game module;

user-manipulatable means on said housing for controlling an operating characteristic of the interactive electronic video game module and thereby interactively affecting the images operatively defined on the screen and projected out of said housing onto a remote display surface for ready viewing by the user;

said housing being predeterminately sized and configured so as to be portably lightweight and hand-held by a user who directs the projected images onto a selected remote display surface by controllably orienting said hand-held housing during use of said device; and

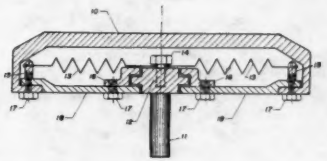
a handle graspable by a user's hand for enabling the user to conveniently supportedly hand-hold and controllably orient the housing for selectively directing the projected images onto the selected remote display surface.

4,976,430

MOVABLE BASES FOR SOFTBALL AND BASEBALL PLAYING FIELDS

Ronald E. Brandon, 1734 Lenox Rd., Schenectady, N.Y. 12308

Filed Aug. 7, 1989, Ser. No. 390,174
Int. Cl.[5] A63B 71/00
U.S. Cl. 273—25 5 Claims



1. A yielding base for securement at a selected location a playfield comprising: a substantially square member having an upper player engaging surface member and a lower ground anchor support surface member, said lower surface member being spaced from said upper surface member by a peripheral wall, said lower surface member having an elongated slot extending diagonally across said base, a slide member positioned in said elongated slot for sliding along said slot, guide means for confining said slide member in said elongated slot and for guiding said slide member along said elongated slot, spring means extending along said elongated slot, said spring means being attached to said slide member and attached substantially opposed diagonal first pair of corners of said base such that said slide member is held at a normally at rest position and will be returned to said normally at rest position after being released from transverse forces applied to said base, means connected to said slide member for anchoring said base at a selected location on a playfield.

4,976,431

BALL TEE

Cameron Guenther, 3314 Aberdeen Avenue, Burlington, Ontario, Canada L7M 3Y3

Filed Mar. 5, 1990, Ser. No. 488,264
Int. Cl.[5] A63B 71/00
U.S. Cl. 273—26 R 5 Claims

1. A ball tee comprising:

an upright helical spring forming a laterally flexible column flaring at its upper end to provide a resting place for a ball; and,

an elongated base member extending coaxially downward from the upright column and adapted to engage the ground;

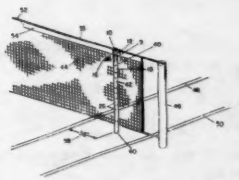
the lowest coils of the upright helical spring being distorted to create a slidable friction grip on the base member whereby the spring is slidably adjustable thereon.

4,976,432

SECTIONED AND HEIGHT ADJUSTABLE SINGLES STICKS WITH MEASUREMENT DEVICE

LeRoy C. Cheney, 1415 E. Pecos, Hobbs, N. Mex. 88240

Filed Jan. 30, 1989, Ser. No. 304,726
Int. Cl.[5] A63B 61/00
U.S. Cl. 273—29 B 3 Claims



1. A singles stick apparatus for holding the top edge of a regulation lawn tennis net at its regulation height above the ground for singles play, the net having a band of predetermined width along its upper edge, comprising:

an elongated stick member of predetermined length having a plurality of separable sections, means for releasably attaching said sections in an end-to-end relationship, one end of said stick having a longitudinal slot, said slot extending from said one end to a predetermined distance towards the other end of said stick, said predetermined distance of said slot serving to accommodate tennis net bands of various widths, said one end of said stick having a plurality of longitudinally spaced openings extending perpendicular to said slot, adjustment means for adjusting the position of a net band within and relative to said slot, thus adjusting the height of a net relative to a tennis court playing surface, said adjustment means being in the form of a peg for selectively extending into said openings and across said slot to contact the bottom edge of a tennis net band, a measuring means adjacent said one end of said stick, said measuring means indicating a predetermined length of said stick when said sections are assembled.

4,976,433

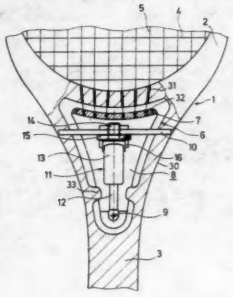
RACKET, AND MORE PARTICULARLY A TENNIS RACKET

Hans Pohlenz, Boppard, and Günter Wagner, Nörtershausen, both of Fed. Rep. of Germany, assignors to Stabilus GmbH, Koblenz-Neuendorf, Fed. Rep. of Germany

Filed May 26, 1989, Ser. No. 358,178
Claims priority, application Fed. Rep. of Germany, May 28, 1988, 3818152
Int. Cl.[5] A63B 51/12
U.S. Cl. 273—73 E 31 Claims

1. A racket for ball games comprising a frame (2) surrounding an internal area, and a plurality of strings (4, 5) extending along said internal area and being under tension, characterized in that at least part of said strings (4, 5) are operatively con-

nected to at least one gas spring tensioning device (11) maintaining said tension of said strings (4, 5), said tensioning device

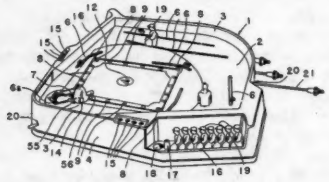


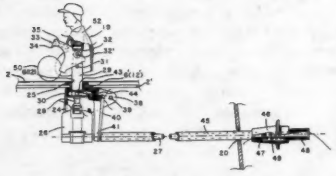
(11) being a component of said racket during the use thereof and being supported by said racket.

4,976,434
TABLE GAME

Erland Wikner, Tranås, Sweden, assignor to Stiga Aktiebolag, Tranas, Sweden

Filed May 19, 1988, Ser. No. 195,832
Int. Cl.[5] A63F 7/06
U.S. Cl. 273—85 B **6 Claims**



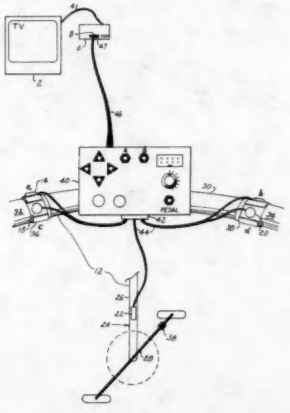


1. A table game of the baseball type including
(a) a substructure comprising a board means having a top surface depicting a baseball field, a frame means enclosing said board and forming an edging around the top surface and an outer wall being higher than the edging and enclosing a free space below the board, said board having a number of openings and a number of transparent indication areas and said board top surface further having sections each sloping towards one of said openings,
(b) a number of player figure assemblies received in the openings of the board and being movable either along or rotatably in said openings, said figure assemblies being mechanically and remotely controlled by control rod assemblies arranged below the board and accessible at the outside of the outer wall,
(c) a number of sensor means attached to the board below the top surface of said adjacent transparent areas,
(d) a number of indicating means arranged below the top surface adjacent the transparent areas,
(e) two sets of push button means comprising manually operated switches,
(f) a computer means having a power source connected to each of said sensor means, said indicating means, and said push button means,
(g) and a projectile having means for activating the sensor means,
wherein a plurality of openings in the board are circular and allow only rotational movement of the figure assembly received therein, and wherein the remaining openings are slot-like to allow both rotational movements and longitudinal movements of the figure assemblies received therein;
wherein the figure assemblies but for one have ejecting means connected to a trigger means associated with the control rod assemblies, capable of ejecting or pushing the projectile radially away from the figure assembly and the remaining figure has a bat-like striking means capable of projecting said projectile tangentially from said figure assembly;
wherein the sensor means are arranged to sense the presence of the projectile on the board area and the indicating means are capable of illuminating the transparent areas adjacent said board area;
and wherein the computer means is fed data from both the sensor means which in turn is activatable by the manually and mechanically propelled projectile on its passage over the transparent indication areas, and from the push button means on being repeatedly manipulated, a predetermined number of times, said computer means arranged to activate the indicating means on being fed the predetermined data.

4,976,435
VIDEO GAME CONTROL ADAPTER

Will Shatford, 8021 Keokuk Ave., Canoga Park, Calif. 91306, and Walter T. Shatford, III, 8 Crystal Cove Rd., Laguna Beach, Calif. 92651

Filed Oct. 17, 1988, Ser. No. 258,833
Int. Cl.[5] A63F 9/00
U.S. Cl. 273—148 B **21 Claims**



1. A video game control adapter apparatus for driving a video game system, the video game system having a plurality of control inputs defining an input domain, the apparatus comprising:
(a) output means for communicating with the video game system;

(b) input means for receiving a plurality of input signals, the input signals defining a user domain; and

(c) converter means for driving the output means in response to the input means, the converter means comprising:

(i) microprocessor means operatively responsive to the input means for controlling the output means; and

(ii) configuration selector means operatively connected to the microprocessor means for selectively changing a functional relationship between the user domain and the input domain.

4,976,436

GOLF PUTTER INCLUDING BALL RETRIEVEL MEANS

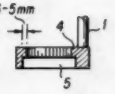
Seijiro Serizawa, Amagasaki, Japan, assignor to Laurel Kaihatsu Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 154,352, Feb. 10, 1988, abandoned. This application Oct. 23, 1989, Ser. No. 425,358

Claims priority, application Japan, Dec. 21, 1987, 52-323303

Int. Cl.[5] A63B *53/04*

U.S. Cl. 273—162 E **4 Claims**



1. A golf putter, comprising:

a shaft having one end portion secured firmly to a head, said head including arc-shaped members extending from both ends of a flat faced ball-striking portion, an opening in the form of a circle extending upward from the hollow bottom and including a first predetermined diameter hollow portion having a first predetermined diameter extending upwardly to a junction with a integral thickened discontinuous vertical wall portion made of the same material as said head and being of a radius which is 3–5 mm less than said first diameter for forming a thickened wall portion for gripping a golf ball.

4,976,437

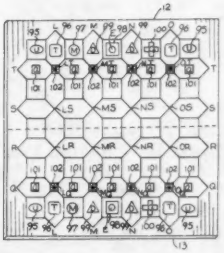
METHOD OF PLAYING A BOARD GAME OF STRATEGY AND CONQUEST

Anthony S. Berard, 128 Birch Bark Dr., Fairview, Tenn. 37062

Filed Dec. 18, 1989, Ser. No. 451,646

Int. Cl.[5] A63F *3/02*

U.S. Cl. 273—261 **1 Claim**



1. A method of playing a board game, comprising the steps of,

providing a game board including a first player side and a second player side positioned on opposing sides of the game board, wherein the game board includes a symmetrical matrix of spaces including first spaces defined by equally spaced columns of vertically arranged hexagonal spaces, second spaces defined by equally spaced rows of horizontally configured hexagonal spaces, and third spaces defined by square spaces, the square spaces symmetrically arranged and positioned between the vertical and horizontal hexagonal rows and columns of first and second spaces respectively, wherein each vertical hexagonal space and each horizontal hexagonal space is sandwiched by a plurality of square spaces, and

each intersection of horizontal and vertical hexagonal spaces defines hexagonal intersection points, and

a plurality of opposing player tokens provided each opposing player for initial arrangement in a mirror-like image relative to one another on the game board, and

wherein each player with a plurality of first tokens, a plurality of second tokens, a single third token, a plurality of fourth tokens, a single fifth token, a single sixth token, a plurality of seventh tokens, and a plurality of eighth tokens, and

including the step of first player side and second player side arranging opposing tokens in a mirror image relationship within a plurality of rows of spaces adjacent each respective first end player second side, and

the positioning of the first, second, third, fourth, fifth, and sixth tokens of the first player side and a second player within adjacent square and hexagonal spaces of a first row adjacent the respective first and second player sides, and

further positioning the seventh token within hexagonal spaces of a second row adjacent each respective first and second player side, and

further including the step of initially positioning the eight tokens at the intersections of the horizontal and vertical hexagonal spaces of the first and second rows of the first and second player sides, and

directing the first token to effect movement vertically and horizontally, and

directing the second token to effect "L" shaped movements including three spaces, and

directing the third token to effect movement in three spaces, and

directing the fourth token to effect diagonal movement, and

directing the fifth token to effect movement in one space, and directing the sixth token to effect a selective vertical, horizontal, or diagonal movement, and

directing the seventh token to effect movement initially of one or two spaces and subsequently of one space, and

directing the eighth token to effect movement to opposing intersections to effect capture of opposing tokens in continuing play according to standard rules of chess until an opposing fifth token is captured.

4,976,438

MULTI-PLAYER TYPE VIDEO GAME PLAYING SYSTEM

Koichi Tashiro, Yokohama; Mamoru Ikezawa, Tokyo; Takashi Sano, Yokohama; Kosei Matsuura, Kawasaki, and Hajime Nakatani, Yokohama, all of Japan, assignors to Namco Ltd., Tokyo, Japan

Filed Mar. 12, 1990, Ser. No. 492,077

Claims priority, application Japan, Mar. 14, 1989, 1-28708[U]

Int. Cl.[5] F41J *5/10, 9/14*

U.S. Cl. 273—313 **19 Claims**

1. A multi-player type video game playing system comprises:

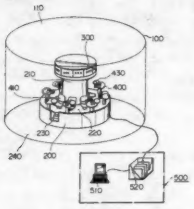
screen means including a transversely arched screen;

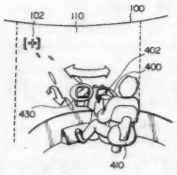
a plurality of projectors arranged radially toward said screen, each of said projectors being allocated to one scene section of a continuously and transversely extending game scene to be projected onto said screen;

a plurality of player's operating sections arranged radially toward said screen; and

processor means for processing a game scene to be projected onto said screen in accordance with input signals from

each of said player's operating sections and a predetermined game program, the image signals so obtained being then supplied to the respective projectors to form said





continuous game scene extending transversely along of said screen, whereby a plurality of players can play and enjoy a game in the common game space while observing the same game scene projected onto said arched screen.

4,976,439

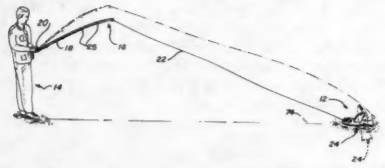
YARD CASTING ASSEMBLY

Sandy F. Kraemer, Colorado Springs, Colo., assignor to New Discovery Ventures, Ltd., Colorado Springs, Colo.

Filed Nov. 21, 1989, Ser. No. 439,477

Int. Cl.[5] A63B *67/10, 69/00*

U.S. Cl. 273—350 **21 Claims**



1. A yard casting assembly operable with a casting rod and reel assembly having a fishing line, comprising:

(a) a main target assembly having a casting connector assembly mounted thereon;

(b) a casting wedge member connectable to the fishing line and engagable with said casting connector assembly in a wedging action;

(c) said main target assembly is provided with a main base member having an upright indicator member mounted thereon;

(d) said main base member resembling the outline of a fish member having a main body section integral with an arcuate tail section; and

(e) said arcuate tail section having arcuate portions engagable with a grassy support surface in order to simulate a wiggling fish structure on being retrieved by movement of the fishing line and said casting wedge member between said casting connector assembly;

whereby an operator of the casting rod and reel assembly can retrieve the fishing line and interconnected casting wedge member so as to engage said casting connector assembly and move said meain target assembly to the operator to simulate a fish catching operation.

4,976,440

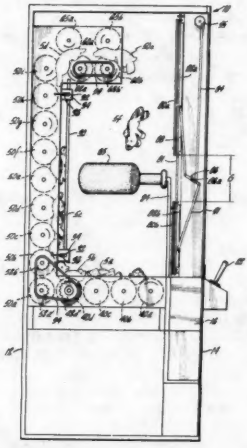
ARCADE-TYPE PRIZE DISPENSING MACHINE

William B. Faith, 6530 Lakeridge Ave., Los Angeles, Calif. 90068

Filed Feb. 21, 1989, Ser. No. 313,409

Int. Cl.[5] A63B *67/00*

U.S. Cl. 273—362 **22 Claims**



1. A method for dispensing prizes in an arcade-type machine comprising the steps of:

placing a plurality of prizes in the machine;

circulating the prizes from a first position in a lower portion of the machine up to a second position at an upper portion of the machine;

dropping the prizes from the second position at the upper portion of the machine and allowing the prizes to free fall to the lower portion of the machine;

providing a mechanism for striking a prize as it free falls from the second position at the upper portion to the first position at the lower portion of the machine; and

dispensing a successfully struck prize.

4,976,441

SINGLE PIECE MOLDED HOUSING AND SPIDER FOR ELECTRONIC DARTBOARD

Samuel Kim, 3820 Charlemagne Dr., Hoffman Estates, Ill. 60195

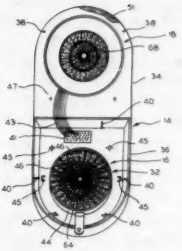
Filed Feb. 15, 1990, Ser. No. 480,608

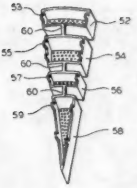
Int. Cl.[5] F41J *3/02, 5/052*

U.S. Cl. 273—376 **9 Claims**

1. A dart game assembly comprising a housing element, a spider, a plurality of target plates and a back plate, said spider being generally circular in shape and comprising a series of circumferentially and radially extending ribs integrally molded with said housing element from a single piece of material, said circumferentially and radially extending ribs forming interiorly spaced cavities that are adapted to receive said plurality of target plates, each of said plurality of target plates comprising

several target segments which are interconnected and capable of independent movement upon being impacted by a dart, said





back plate being integrally molded from a single piece of material and being attached to said housing element.

4,976,442

ARROW WITH REMOVABLE TRANSMITTER AND METHOD OF USE

Woodrow L. Treadway, 505 W. Main, Jonesboro, La. 71251

Filed Jan. 17, 1989, Ser. No. 297,615

Int. Cl.[5] F41B *6/04*

U.S. Cl. 273—416 **13 Claims**

1. In a hunting arrow having a shaft provided with an arrowhead at one end and a nock at the opposite end for driving the arrow when hunting an animal, the improvement and combination therewith comprising a notch provided in said shaft; a radio transmitter adapted to fit in said radio notch, a bevel provided in one end of said radio transmitter and an antenna provided in said radio transmitter; and hook means carried by said radio transmitter, with said hook means extending from said one end of said radio transmitter above said bevel and a segment of said hook means projecting through said notch, whereby said segment of said hook means engages and lodges in the animal and removes said radio transmitter for said notch responsive to penetration of the animal by said arrow.

4,976,443

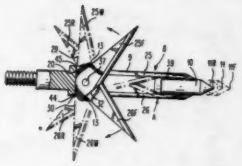
ARROW SYSTEM

Paul V. DeLucia, Rte. 82 R.D. 6 Box 12, Hopewell Junction, N.Y. 12533

Filed Jun. 10, 1988, Ser. No. 205,077

Int. Cl.[5] F42B *6/08*

U.S. Cl. 273—421 **43 Claims**



1. A hunting arrow for maximizing penetration, shock, hemorrhaging and bleed-out comprising:

(a) an arrow shaft;

(b) an arrowhead connected to said arrow shaft;

(c) said arrowhead having a graduated step punch configuration comprising

(1) a first inclined step on the forward end of said arrowhead having a first taper angle of not less than substantially sixty degrees, which is the included angle formed by both thirty degree angles with reference to the longitudinal centerline axis bisecting said first inclined step, adapted to force matter forward and to the side rather than separate the matter, followed by a straight portion parallel to the center axis of said arrowhead; and

(2) a second inclined step beginning at the rearward end of said straight portion having a second taper angle adapted to further force matter forward and to the side rather than to separate the matter;

(d) whereby said graduated step punch configuration creates a less restricted path, with said first inclined step clearing the greatest amount of the matter from the path of said arrowhead and said arrow shaft by directing their kinetic energy to force matter forward and clear it to the side, thereby maximizing penetration, shock, hemorrhaging and bleed-out.

4,976,444

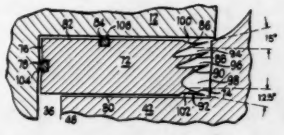
SEAL AND SEAL ASSEMBLY

Robert L. Richards, Dickenson, Tex., assignor to Amoco Corporation, Chicago, Ill.

Filed Aug. 21, 1989, Ser. No. 396,941

Int. Cl.[5] F02F *11/00*; F16J *15/48*; F01D *11/02*

U.S. Cl. 277—53 **20 Claims**

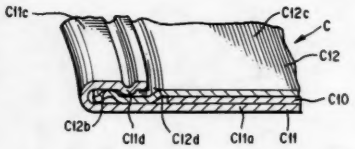


1. An annular sealing element comprising a first impeller-facing side in alignment with a radial axis and a second case-facing side opposite said first side, and an inner axial surface in alignment with an axial axis and an outer axial surface opposite said inner axial surface; said first side including a plurality of inclined teeth having grooves therebetween, each tooth tapering from wide to narrow in a direction opposite said second side, at least one of said teeth extending away from said axial axis and one extending toward said axial axis.

4,976,445
STEEL LAMINATE GASKET

Tsunekazu Udagawa, Ichikawa, Japan, assignor to Ishikawa Gasket Co., Ltd., Tokyo, Japan

Filed Jul. 5, 1989, Ser. No. 375,626
Int. Cl.[5] F16J 15/08
U.S. Cl. 277—231 9 Claims



1. A steel laminate gasket for an internal combustion engine having at least one hole to be sealed, comprising:

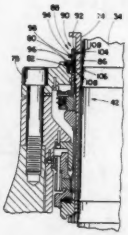
a first plate including a base portion extending throughout the entire area of the gasket, at least one first hole corresponding to the hole of the engine, a curved portion extending substantially perpendicularly to the base portion and defining the first hold, a flange located above the base portion to extend away from the first hole, at least one first bead formed int he flange to extend toward the base portion, and an annular space on the flange corresponding to the first bead so that the flange except the space is adapted to substantially contact an engine block when the gasket is tightened, and

a second plate situated above the base portion of the first plate at the side of the flange, said second plate having a second hole with a diameter larger than that of the flange so that when the first and second plates are assembled, the flange is situated inside the second hole, said flange extending freely outwardly inside the second hole to facilitate deformation of the first bead when the gasket is tightened.

4,976,446
REACTOR COOLANT PUMP AUXILIARY SEAL FOR REACTOR COOLANT SYS.EM VACUUM DEGASIFICATION

James D. Fornof, Pittsburgh, Pa., assignor to Westinghouse Electric Corp., Pittsburgh, Pa.

Division of Ser. No. 222,649, Jul. 21, 1988, Pat. No. 4,847,041.
This application May 9, 1989, Ser. No. 351,135
Int. Cl.[5] F16J 15/16, 15/38
U.S. Cl. 277—198 13 Claims



1. An auxiliary seal for a reactor coolant pump, said seal comprising:

(a) sealing means adapted to be fitted about a shaft of the pump, said sealing means including at least a pair of sealing segments having arcuate shaped bodies and opposite ends;

(b) means for releasably attaching said sealing segments together at their opposite ends so as to provide the interior circumferential portions of said ends for sealing and clamping engagement with and about the shaft of the pump and so as to provide exterior circumferential portions of said ends for sealing engagement with an interior portion of a housing of the pump;

(c) means for releasably anchoring said sealing means to the pump housing adjacent to the pump shaft;

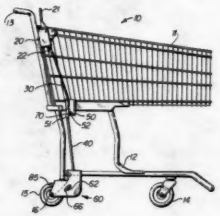
(d) gasket elements placed and clamped between said respective opposite ends of said attached sealing segment bodies; and

(e) said seal being auxiliary to a mechanical face sealing structure defined by two opposed sealing rings sealing along an interface and one ring rotating relative to the other, said seal being axially offset from the sealing structure relative to the axis of the shaft.

4,976,447
APPARATUS FOR RESTRAINING THE MOVEMENT OF WHEELED CARTS

Jack Batson, 4906 Monona Cir., Birmingham, Ala. 35244

Filed Jan. 3, 1989, Ser. No. 293,123
Int. Cl.[5] B62B 5/04
U.S. Cl. 280—33.994 10 Claims



1. An apparatus for restraining the movement of wheeled carts such as shopping carts or other similar vehicles having a frame, a handle, and wheels, said apparatus comprising:

an engagement lever;

means for rotatably attaching said engagement lever to said cart or vehicle;

a housing for securing said engagement lever to said cart or vehicle;

a connecting rod attached to said engagement lever at a position on said engagement lever which produces a reciprocating movement of said connecting rod as said engagement lever is rotated about its axis;

an engagement rod attached to said connecting rod and extending downwardly along the side of said cart or vehicle to a termination point;

a linkage assembly attached to said engagement rod at the point of termination of said engagement rod;

a common axle, extending horizontally the entire width of said cart or vehicle, rotatably attached to said cart or vehicle and operatively attached to said engagement rod through said linkage assembly;

a pair of levers, spacably and non-rotatably attached to said common axis with one of said pair of levers also rotatably attached to said linkage assembly in a manner whereby any reciprocating movement of said linkage assembly produces rotation of said common axle;

a pair of operating rods each rotatably attached to one of said pair of levers and extending downwardly therefrom to a point near two of the wheels of said cart or vehicle;

means, attached to each of said operating rods, for restraining the movement of said wheels of said cart or vehicle.

4,976,448

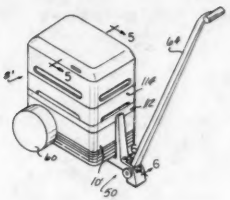
MOBILE COOLER CHEST AND COOLER CHEST SUPPORT

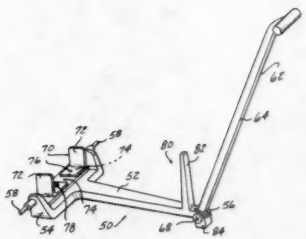
Wayne M. Wickersham; Colleen A. Wickersham, both of Roseville; Kevin G. Diener; JoAnn S. Diener, both of St. Clair Shores, and Brian Skogler, Spring Lake, all of Mich., assignors to Right Products, Inc., St. Clair Shores, Mich.

Continuation-in-part of Ser. No. 205,680, Jun. 13, 1988, abandoned. This application Aug. 1, 1989, Ser. No. 388,669

Int. Cl.[5] B62B *1/04, 1/06*

U.S. Cl. 280—47.2 **1 Claim**





1. A cooler chest support, comprising:

a T-shaped support member having a first end and a second end, the first end being formed as an elongated leg, the leg having an upper surface;

two axles, each axle mounted on an opposite end of the leg at an upwardly bent position thereof;

a wheel rotatably mounted on each axle;

a T-shaped pull handle for pulling the cooler chest support, the handle having a J-shaped distal end removably attachable to the second end of the support member;

two L-shaped brackets, for adjustably clamping a cooler chest to the support member leg, the brackets adjustably attached to the upper surface of the leg of the support member, the brackets adapted to move longitudinally relative to the leg;

a plurality of spaced apertures formed in one of the leg and the brackets;

an aperture formed in the other of the leg and the brackets, the aperture being alignable with any one of the plurality of apertures;

means, receivable through the aligned apertures, for fastening the brackets to the support member in a predetermined lateral spacing;

a stop, joined to and extending upward from the support member, for preventing forward longitudinal movement of the cooler chest with respect to the support member, the stop being intermediate the first and second ends of the support member; and

a stand off, joined to and extending downward from the second end of the support member, for supporting the cooler chest support in a level position.

4,976,449

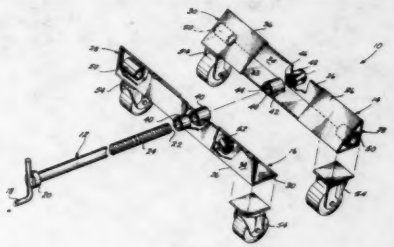
PORTABLE WHEEL DOLLY

Wayne D. Lotspeich, Selah, and Lee R. Irwin, Yakima, both of Wash., assignors to Lotspeich-Irwin-Crotty, Inc., Yakima, Wash.

Filed Jun. 29, 1989, Ser. No. 374,288

Int. Cl.[5] B60P *3/40*

U.S. Cl. 280—79.4 **20 Claims**



1. A portable wheel dolly for supporting a set of dual wheels, the wheel dolly comprising:

a first elongate frame member, said first frame member having a first end, a second end, and one or more planar faces at least partially spanning said first member between said first end and said second end;

a second elongate frame member, said second elongate frame member having a first end, a second end, and one or more planar faces at least partially spanning said second frame member between said first end and said second end;

means for connecting said first and said second frame members in either an operating configuration, wherein said first and second frame members are held in spaced, parallel relationship such that said planar faces cooperate with a tread portion of a set of dual wheels to support the dual wheels in an upright position, or a stored configuration, wherein said first and second frame members are held in end-to-end relationship, said means for connecting said first and second frame members including a connecting bar that is received within said first and second frame members; and

means within one of said first and second frame members for securing one end of said bar thereto when assembled in the stored configuration.

4,976,450

MOBILE TOOL CHEST WITH HORIZONTAL PIVOTAL TRAYS

Laurence M. Ellefson, 508 Canyon Dr., Solana Beach, Calif. 92075

Continuation of Ser. No. 154,369, Feb. 10, 1988, abandoned. This application Jun. 26, 1989, Ser. No. 371,191

Int. Cl.[5] B62B *3/02*

U.S. Cl. 280—79.11 **21 Claims**

1. A mobile tool chest for securing and displaying a plurality of stowed tools in an orderly manner for ready access comprising:

(a) an elongated generally upright rectangular support structure;

(b) a plurality of generally rectangular pivotal trays disposed above and pivotally mounted to said support structure for pivoting horizontally with respect thereto between a stowed position adjacent and directly above said support structure and extended positions for display and access of tools;

(c) a counterweight mounted to lower extremities of said support structure for preventing over-turn of same with said pivotal trays extended from said support structure;

(d) a plurality of wheels mounted to lower extremities of said

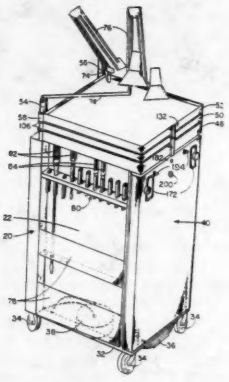
support structure for mobility of said mobile tool chest on a supporting surface;

(e) locking means for releasably locking said pivotal trays in a stowed position for securing said stowed tools against unauthorized access;

(f) removable key means for controlling locking and releasing of said locking means; and

(g) said support structure comprising:

a pair of laterally spaced upright side panels, said panels being inwardly recessed members with an outside and top opening disposed generally parallel to each other and having top, lower, upright front, and upright rear edges;



an upright rear panel, said rear panel being an inwardly recessed member with an outside and top opening having top, lower, upright side edges, and vertical corners being disposed generally normal to said side panels by attaching said vertical corners to the upright rear edges of said side panels;

a top stationary tray, said tray being an inwardly recessed member with a top opening and having top front, rear, and side edges being disposed generally normal to said side and rear panels by attaching edges of said top stationary tray to top edges of said side and rear panels; and

a base attached generally normal to said side and rear panels at the lower edges of same having means for mounting said plurality of wheels and said counterweight.

4,976,451

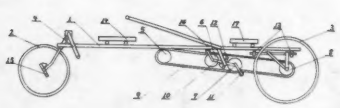
HUMAN POWERED VEHICLE

Kamen G. Kamenov, 244 4th Ave., San Francisco, Calif. 94118

Filed Aug. 24, 1988, Ser. No. 235,470

Int. Cl.[5] B62M *1/12*

U.S. Cl. 280—226.1 **1 Claim**



1. A human-powered vehicle comprising a frame, a front steerable wheel mounted to a forward portion of said frame, at least one drivable rear wheel mounted to a rearward portion of said frame,

an operator board attached to an upper portion of said frame,

a first one-way freewheel operatively attached to said rear wheel,

a first two-way freewheel attached to said frame,

a continuous chain connecting and encircling said first one-way freewheel and said first two-way freewheel, forming a upper and a lower portion,

a pedal assembly comprising pedals and a bar holding said pedals,

a second one-way freewheel connecting said bar to said upper chain portion,

a third one-way freewheel connecting said bar to said lower chain portion,

wherein a forward motion of said pedal assembly propels the upper portion of the chain forward through said second one-way freewheel thereby driving the rear wheel

and a rearward motion of said pedal assembly propels the lower portion of said chain rearward through said third one-way freewheel thereby driving the rear wheel.

4,976,452

STAND DEVICE FOR TWO WHEELED VEHICLES

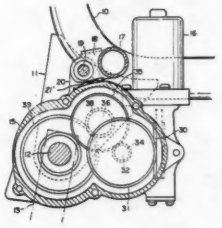
Haruyasu Fujita, Tokyo, Japan, assignor to Honda Giken Kogyo Kabushiki Kaisha, Tokyo, Japan

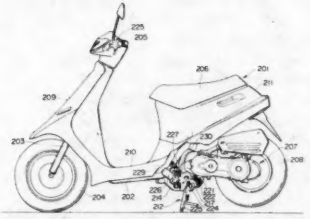
Filed May 1, 1989, Ser. No. 345,691

Claims priority, application Japan, May 6, 1988, 63-108935

Int. Cl.[5] B62H *1/02*

U.S. Cl. 280—293 **11 Claims**





1. A stand device for two wheeled vehicles having a vehicle frame, comprising:

(a.) a stand member rotatably supported by said vehicle frame;

(b.) a drive mechanism attached to said vehicle frame and operatively connected to said stand member to rotate said stand member between an upright position in which said stand member supports said vehicle and a retracted position angularly displaced from said upright position, said drive mechanism including a motor, reduction gearing for drivingly connecting said motor to said stand member, and a housing for mounting said motor and said reduction gearing; and

(c.) means for attaching said drive mechanism to said vehicle frame including pivot support means for supporting said housing from said vehicle frame for pivoted movement in a direction counter to the direction of movement of said

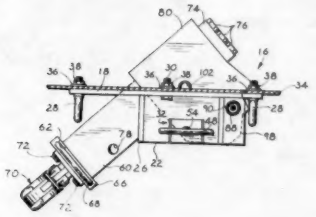
stand member in moving to said upright position, and buffer means interposed between said housing and said vehicle frame at a location remote from said pivot support means for absorbing force increases between said stand member and said drive mechanism when said drive mechanism pivots said stand member during operation thereof.

4,976,453

TOWING HITCH WITH SHIFTABLE HITCH MEMBER

James H. Kaplan, Mission Hills, Kans., assignor to Harlan Corporation, Kansas City, Mo.

Filed May 8, 1989, Ser. No. 348,514
Int. Cl.[5] B60D *1/40*
U.S. Cl. 280—479.2 5 Claims



1. A trailer hitch for coupling a towing vehicle with a trailer, said hitch comprising:

a rigid framework allowing a connection to a towing vehicle;

a hitch member having a connection end adapted for coupling with a trailer;

means operably attaching said hitch member to said framework for allowing selective shifting of said connection end within an area of movement for facilitating trailer coupling, said attachment means including

an elongated hitch body secured to said hitch member and presenting a forward end adjacent the hitch member and a spaced, opposed rearward end;

means supporting said hitch body for fore and aft axial shifting thereof between a forwardly shifted extended position and a rearwardly shifted retracted position, and for pivotal movement of the hitch body about a pivot axis,

said supporting means comprising a bracket for shiftably receiving said hitch body and permitting said axial shifting thereof between said extended and retracted positions, said bracket presenting spaced, opposed front and rear margins and laterally spaced apart side edges,

said supporting means further including means pivotally coupling said bracket to said rigid framework about a pivot axis which is transverse to and laterally offset from said hitch body longitudinal axis and located proximal to one of said side edges of said bracket,

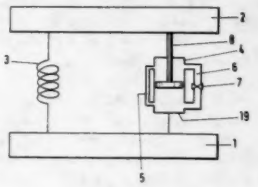
said framework including structure defining a bracket-clearing passageway permitting rearward pivoting of said bracket to a point where said hitch body rearward end and portions of said bracket rearward margin and said side edge remote from said pivot axis are positioned rearwardly of the pivot axis.

4,976,454

SUSPENSION DEVICE FOR VEHICLES

Gerhard Bohn, Munich, Fed. Rep. of Germany, assignor to Messerschmitt-Bölkow-Blohm GmbH, Munich, Fed. Rep. of Germany

Filed May 26, 1989, Ser. No. 357,467
Claims priority, application Fed. Rep. of Germany, May 28, 1988, 3818179
Int. Cl.[5] B60G *17/08*; B61F *5/14*
U.S. Cl. 280—707 6 Claims



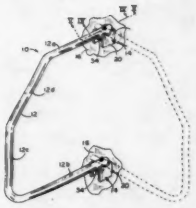
1. A suspension device for a vehicle having a body and a chassis, especially a high-speed railborne vehicle, said device being arranged between the body and the chassis and having at least one flexible spring with low oscillation frequency, an excursion rate and a full excursion range, and further including a damping element connected in parallel to said spring, wherein the damping element is an active damping element with a controllable damping ratio, said damping element comprising an hydraulic piston, a first bypass having constant throttle action and a second bypass having a throttle valve, the throttle valve being connected to a controlling device that opens or closes the throttle valve as a function of the excursion rate of the flexible spring or of the lateral acceleration values of the body and the chassis, said first bypass having constant throttle action providing a nominal value of damping when said throttle valve in said second bypass is fully opened, and said damping element having an amount of damping which continuously varies from said nominal amount of damping to a maximum amount of damping over a limited excursion range of said flexible spring less than said full excursion range and having said maximum amount of damping when said throttle valve in said second bypass is completely closed.

4,976,455

HANDRAIL

Robert C. Brammer, Sr., and Robert C. Brammer, Jr., both of Traverse City, Mich., assignors to Stromberg-Carlson Products, Inc., Traverse City, Mich.

Filed Nov. 21, 1988, Ser. No. 274,399
Int. Cl.[5] B60R *27/00*
U.S. Cl. 280—762 7 Claims



1. A handrail for use on vehicles, said handrail comprising:

a generally U-shaped rail having upper and lower end segments;

means for swingably attaching said rail at said upper and lower end segments to the side of said vehicle adjacent an entry-exit point;

first means for retaining said rail in a first, operative position which is generally perpendicular to the side of said vehicle so that said rail may be grasped by the user to facilitate entry and exit;

second means for retaining said rail in a second, collapsed, storage position generally parallel to the side of said vehicle to avoid interference in situations such as during travel of said vehicle;

means for enabling said rail to be selectively swingably shifted into said first operative position or said second storage position, permitting said rail to be swung into and retained at said first position or into and retained at said second position;

said first means for retaining said rail in said first, operative position comprising brackets, each of said brackets having a vertical gap, said upper and lower end segments of said rail fitting into said gaps to prevent any substantial inadvertent pivoting of said rail when in its first, operative position;

said rail being movable between said first, operative position and said second, storage position by vertically lifting said rail out of said gaps and swinging it horizontally about a substantially vertical pivot axis;

said brackets comprising substantially identical upper and lower brackets, said gap of said upper bracket receiving a portion of said upper end segment and said gap of said lower bracket receiving a portion of said lower end segment when said rail is placed into said operative position, an upper bracket recess receiving a portion of said upper end segment and a lower bracket recess receiving a portion of said lower end segment when said rail is placed into said collapsed position;

each of said upper and lower brackets including a generally horizontally extending flange positioned within said gap upon which said upper and lower end segments rest when said rail is in said operative position.

4,976,456

MARKING SYSTEM

David E. Jack, Irvine, Calif., assignor to Prevent-A-Crime International, Inc., Santa Ana, Calif.

Filed Sep. 28, 1988, Ser. No. 250,314

Int. Cl.[5] B42D 15/00

U.S. Cl. 283—70 18 Claims

1. A method of marking property, comprising: forming in an impressionable label a physical impression which is substantially invisible to the casual observer;

applying visible marking material to said physical impression and its surrounding area when it is desired to make the physical impression visible; and

wiping said surrounding are to remove the marking material, which results in removing the material surrounding the physical impression while leaving marking material in the physical impression to form visible indicia.

4,976,457

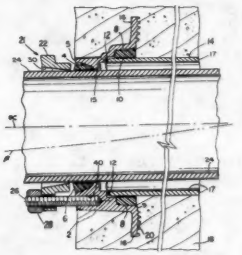
SLEEVE ADAPTER

William Carter, Marshfield, Mass., assignor to Water Works Supply Corporation, Malden, Mass.

Filed Dec. 7, 1988, Ser. No. 281,101

Int. Cl.[5] F16L 7/00

U.S. Cl. 285—158 10 Claims



10. A sleeve adapter for locating a carrying pipe in a structural, member comprising:

an annular apertured hub having a central axis and a first annular surface adjacent a first face of the hub sloping inwardly toward the axis;

a second annular surface adjacent a second face of the hub;

a third annular surface intermediate the first and second surfaces and having a diameter smaller than the second annular surface,

a circumferential flange adjacent the second face of the hub wherein said flange has annuli concentric with the central axis;

a mechanical joint gasket engaging the first annular surface for locating a throughpipe concentric with the central axis;

a sleeve pipe abutting the third annular surface;

a push-on gasket engaging the second annular surface and the sleeve pipe thereby locating, the sleeve pipe concentric with the central axis; and

pressure means urging the mechanical joint gasket against said first annular surface and the throughpipe thereby allowing alignment of the throughpipe relative to the central axis.

4,976,458

INTERNAL TIEBACK CONNECTOR

Stanley Hosie, Houston, Tex., and Luis A. G. Araujo, Rio de Janeiro, Brazil, assignors to Vetco Gray Inc., Houston, Tex.

Filed Oct. 16, 1989, Ser. No. 422,109

Int. Cl.[5] F16L 35/00

U.S. Cl. 285—24 3 Claims

1. In a tieback system for a subsea well, having a subsea wellhead housing with an upper rim, a tieback connector having a body secured to a string of riser and a funnel extending downward for sliding over the wellhead housing, the body having a downward facing seat for landing on the rim of the wellhead housing, the body having an axial bore containing an upward facing shoulder, an improved means for connecting the tieback connector to the wellhead housing, comprising in combination:

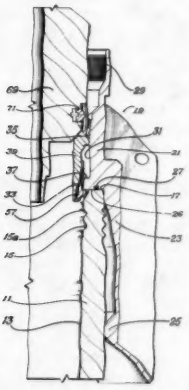
an internal circumferential groove formed in the wellhead housing;

a lockdown sub carried in the bore of the body, having an exterior containing a downward facing shoulder and a tapered surface spaced below the downward facing shoulder;

a set of threads formed on the tapered surface of the lockdown sub;

a split lock ring having a protruding profile on its exterior adapted to engage the internal groove in the wellhead housing, the lock ring having a bore containing a set of threads adapted to engage the threads on the tapered surface of the lockdown sub;

means in the bore of the body and on the exterior of the lockdown sub for carrying the lockdown sub in an upper recessed position with the downward facing shoulder of the lockdown sub spaced above the shoulder in the bore, and for allowing the lockdown sub to be lowered to a locking position with the downward facing shoulder of the lockdown sub engaging the shoulder in the bore after the seat of the body lands on the rim of the wellhead housing;



means for carrying the lock ring on the exterior of the lockdown sub in a lower position relative to the lockdown sub while the lockdown sub is in the upper recessed position; and

means for preventing the lock ring from rotating relative to the lockdown sub while the lockdown sub moves into the locking position, allowing the threads of the lockdown sub to be rotated relative to the threads of the lock ring, causing the lockdown sub to move downward relative to the lock ring, urging the profile of the lock ring outward into the internal groove of the wellhead housing and tightening the seat of the body against the rim.

4,976,459

WARMUP METHOD FOR A TWO STAGE FURNACE

Gregory A. Lynch, Murfreesboro, Tenn., assignor to Inter-City Products Corporation (USA), LaVergne, Tenn.

Filed Feb. 9, 1990, Ser. No. 478,206
Int. Cl.[5] G05D 23/00
U.S. Cl. 236—11 2 Claims

1. In a two stage furnace having a gas burner and at least one heat exchanger, a method of initially warming the heat exchanger comprising the steps of:

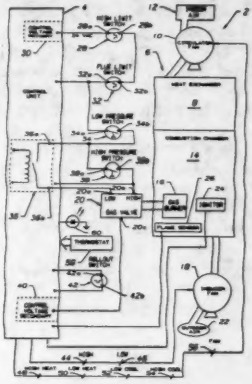
providing a gas valve having a low and high combustion operating setting, an inducer fan having a low and high speed operating setting, and a circulator fan having a low and high speed operating setting;

determining that the furnace has been enabled;

operating said gas valve on said high combustion setting and said inducer fan on said high speed setting;

delaying said circulator fan by a predetermined heat on delay and then operating said circulator fan at said low speed setting;

determining when a predetermined warmup time has expired, and after expiration operating said gas valve, said



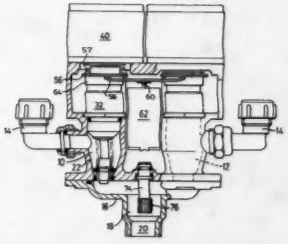
inducer fan, and said circulator fan at one of the combustion settings.

4,976,460

THERMOSTATIC VALVES

Haydn J. Newcombe, and Jeffrey C. Lowe, both of Wolverhampton, England, assignors to Armitage Shanks Ltd., United Kingdom

Continuation of Ser. No. 214,524, Jul. 1, 1988, abandoned. This application Dec. 11, 1989, Ser. No. 449,474
Claims priority, application United Kingdom, Jul. 3, 1987, 8715717
Int. Cl.[5] F16K 1/00
U.S. Cl. 236—12.12 4 Claims



1. A thermostatic mixing valve for hot and cold liquids comprising a valve body having separate hot and cold liquid inlets each communicating with a corresponding separate valve chamber both of which communicate with a manifold having a common outlet through which a mixture of said liquids may flow; each of said chambers including a cylindrical portion terminating at the larger end of a first frusto-conical portion of steep angle, the smaller end of said first frusto-conical portion communicating with a smaller frusto-conical portion of shallow angle, the smaller end of said smaller frust-conical portion opening to a further and still smaller cylindrical passage communicating with said manifold, said chamber portions being arranged for successive flow therethrough from said inlet to said manifold; a separate valve assembly located in each of said chambers, each said assembly comprising a cylindrical plug movable between a first position in which the outlet of the corresponding chamber is fully open and in which said plug is wholly located in said first frusto-conical portion, and a

fully closed position in which said plug is wholly located in said further smaller cylindrical passage, and through a series of intermediate partly opened positions offering progressively greater clearance between said plug and the chamber wall so as to allow for fine control over flow rate through said chamber and to said manifold, a stem mounting said plug fast with a threaded nut, said nut being angularly fast in said assemsbly but free for axial movement therein to move the plug to any selected position between said fully open position via said intermediate positions to the fully closed position, said assembly further including a screw threadedly engaged with said nut, said screw being axially fixed but free for rotation in said assembly; a temperature sensor for sensing the temperature of the mixture of liquids; a separate stepping motor connected to each of said screws; and means responsive to a change in the temperature of said mixture of liquids to actuate one or other of said motors and adjust the position of the associated plug in a direction to control said flow rate so as to maintain the temperature of said mixture of liquids substantially constant.

4,976,461

AIR CONDITIONER FOR AUTOMOBILES

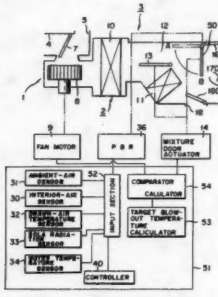
Eiji Takahashi, Tokyo, Japan, assignor to Calsonic Corporation, Tokyo, Japan

Filed Dec. 27, 1989, Ser. No. 457,399

Claims priority, application Japan, Dec. 28, 1988, 63-331068

Int. Cl.[5] G05D *23/13*

U.S. Cl. 236—13 **7 Claims**



1. An air conditioner for automobiles, comprising:

an intake unit (1) which is provided with a fan (8) driven by a fan motor (9) and which selectively takes interior or ambient air in;

a heater unit (3) which is provided with a heater core (11) for heating the intake air and with a bypass passage (12) extending around the heater core (11), and which conditions the intake air and supplies the conditioned air to a place in the room or interior of an automobile in which the air conditioner is mounted;

a mixture chamber (15) formed within said heater unit (3) downstream of the heater core (11), and

an auxiliary mixture door (50) which is rotatable between a position (B) in which it will deflect the air flow through said bypass passage (12) toward the air flow which has passed the heater core (11) into the mixture chamber (15) and another position (A) in which it will leave the bypass passage (12) open,

said air conditioner being characterized in that control means (51) is provided for increasing the speed of rotation of the fan motor (9) by a predetermined amount when said auxiliary mixture door (50) is in the deflecting position (B) than when the auxiliary mixture door (50) is in the opening position (A).

4,976,462

WATER COOLING MEANS FOR ENGINE

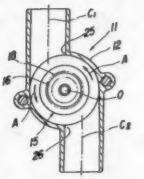
Akira Hirata, Shizuoka, and Iwao Masumoto, Shimada, both of Japan, assignors to Yamaha Hatsudoki Kabushiki Kaisha, Iwata, Japan

Filed Mar. 19, 1987, Ser. No. 27,786

Claims priority, application Japan, Mar. 20, 1986, 61-62092

Int. Cl.[5] F01P *7/02*

U.S. Cl. 236—345 **10 Claims**



4. A thermostat arrangement for an internal combustion engine having an outer housing defining an internal cavity, a thermostatic valve contained within said outer housing and defining first and second portions of said internal cavity, said thermostatic valve being movable between a closed position wherein communication between said portions is restricted and an open position wherein said portions have substantially unrestricted communication, an inlet port extending into one of said housing portions, at least one of said ports being configured relative to its associated housing portion for directing the flow of coolant against said thermostatic valve for generating a swirl around said thermostatic valve for precluding the transmission of pulsations through said outer housing to the associated cooling system, said one housing portion being generally cylindrical in configuration and the one port is offset to one side of the cylinder from its axis for generating the swirl.

4,976,463

HEATING SYSTEM FOR VEHICLE

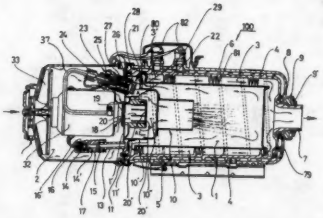
Yang K. Soo, Seoul, Rep. of Korea, assignor to Hanil Industrial Co., Ltd., Seoul, Rep. of Korea

Filed Mar. 15, 1989, Ser. No. 323,755

Claims priority, application Rep. of Korea, Jun. 30, 1988, 88-7979[U]

Int. Cl.[5] F24D *3/00*

U.S. Cl. 237—8 C **20 Claims**



1. A heating system for use with a vehicle having a radiator and an engine, comprising:

a boiler which includes means for introducing a fuel, a burner, means for introducing a combustible gas, and a combustion chamber;

a heating unit for directing heat to the vehicle;

a fluid circulation system for circulating a fluid past the vehicle radiator and engine as well as said boiler, said fluid circulation system comprising a main line which divides into a branch line and a bypass-line, said branch line di-

rects the fluid past said heating unit and said bypass-line directs the fluid around said heating unit and back into communication with said branch line such that the fluid avoids contact with said heating unit; and

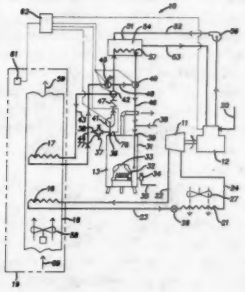
control valve means for determining whether the fluid avoids or comes in contact with said heating unit, and wherein said boiler includes a fluid jacket formed of a plastic material, a casing defining said combustion chamber and a heat exchanger positioned between said casing and said fluid jacket, said heat exchanger including a protruding exhaust gas conduit at one end which extends through an opening formed in said fluid jacket, said boiler further including a gasket formed of a material which conducts heat at a rate which is less than that of said casing, said gasket surrounding said exhaust gas conduit and being positioned so as to prevent the portion of said fluid jacket defining the opening in said fluid jacket from coming in contact with said exhaust gas conduit, and said heating system further comprising a radiating cap surrounding and secured to said exhaust gas conduit, said radiating cap including a projection which is dimensioned so as to compress the portion of said fluid jacket defining the opening in said fluid jacket into contact with said gasket.

4,976,464

FUEL-FIRED HEAT PUMP SYSTEM

Paul F. Swenson, Shaker Heights, Ohio, assignor to Consolidated Natural Gas Service Company, Inc., Pittsburgh, Pa.

Filed Mar. 10, 1989, Ser. No. 321,893
Int. Cl.[5] F25B *27/00*
U.S. Cl. 237—81 **8 Claims**



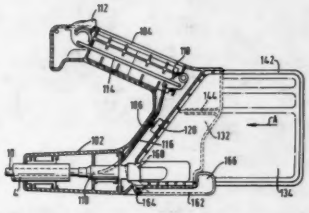
1. A heating system for an enclosed space such as a house comprising a heat engine operatively connected to a heat pump compressor, a first heat exchanger in thermal communication with air in the space and connected to receive working fluid compressed by the compressor, a second heat exchanger in thermal communication with a zone outside the enclosed space and connected to receive working fluid from the first heat exchanger and to deliver it to an inlet of the compressor, thermal storage means for absorbing heat rejected by the heat engine, means for selectively transferring heat from the thermal storage means to the air in the space, and control means for establishing operation of said heat transferring means to conduct heat to said space from said storage means without operation of said heat engine and heat pump compressor in a period of heat demand following the termination of a period of operation of said heat engine and heat pump compressor satisfying a prior heat demand whereby thermal efficiency losses due to on and off cycling of said heat engine and heat pump compressor are reduced.

4,976,465

EQUIPMENT FOR DELIVERING FLUID

David C. Gill, Keynsham, and Eren Ali, London, both of United Kingdom, assignors to Nomix Manufacturing Company Limited, Bristol, United Kingdom

Filed Jul. 19, 1988, Ser. No. 221,284
Claims priority, application United Kingdom, Jul. 20, 1987, 8717048; Apr. 20, 1988, 8809307
Int. Cl.[5] B05B *3/10*
U.S. Cl. 239—224 **13 Claims**



1. Filed delivery equipment comprising:

a container of the fluid to be delivered;

an outlet fitting provided on the container;

a supporting member adapted to receive the container in a releasable manner;

an inlet fitting provided on the supporting member and adapted for releasable connection to the outlet fitting of the container;

a delivery device carried by the supporting member;

a duct connecting the inlet fitting to the delivery device;

a releasable latching device, mounted on the supporting member for movement about a pivot axis, for retaining the container with respect to the supporting member;

the latching device comprising first and second arms extending from the pivot axis, the first arm carrying an abutment element which abuts the container and the second arm carrying a latching element which makes latching engagement with the container to prevent removable of the container from the supporting means, the latching device constructed and arranged such that displacement of the latching element out of latching engagement with the container causes pivotal movement of the latching device resulting in displacement of the abutment means to move the container in a direction away from the supporting member to disconnect the inlet fitting from the outlet fitting.

4,976,466

THRUST REVERSER FOR A TURBOJET ENGINE

Guy B. Vauchel, Le Havre, France, assignor to Societe anonyme dite Hispano-Suiza, Saint-Cloud, France

Filed Jul. 17, 1989, Ser. No. 380,334
Claims priority, application France, Jul. 18, 1988, 88 09671
Int. Cl.[5] F02K *1/64*
U.S. Cl. 239—265.29 **12 Claims**

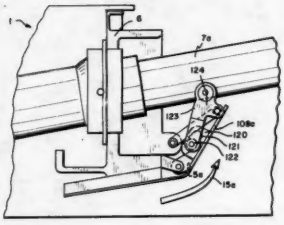
1. A thrust reverser for a turbojet engine having a housing extending around a longitudinal axis of the engine with an exterior surface, an interior surface defining an outer boundary of a cold gas flow duct and defining a lateral opening, the thrust reverser comprising:

(a) a thrust reversing door attached to the housing so as to be movable between a first, forward thrust position wherein an outer surface of the door is substantially flush with the exterior surface of the housing and the door covers the lateral opening, and a second, reverse thrust position wherein the lateral opening is uncovered and the door directs the gas through the lateral opening to provide a reverse thrust force;

(b) a stationary frame extending between the exterior and interior surfaces of the housing;

(c) actuator means pivotally connected to the frame and the door to move the door between its first and second positions;

(d) deflector means attached to the frame with a single degree of freedom, and movable between a first, forward



thrust position and a second, reverse thrust position, said deflector means directing gas flow in both said first and second positions; and,

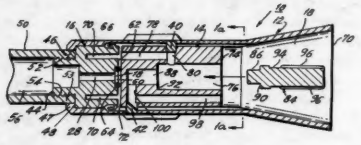
(e) linkage means connecting the deflector means to the actuator means such that pivoting motion of the actuator means as it moves the thrust reverser door between its first and second positions moves the deflector means between its first and second positions.

4,976,467

LIQUID SPRAYING NOZZLE

Clive R. Paige, Berkshire, England, assignor to Shop-Vac Corporation, Williamsport, Pa.

Filed Nov. 30, 1989, Ser. No. 443,922
Int. Cl.[5] B05B *3/06*
U.S. Cl. 239—381 **21 Claims**



1. A spraying nozzle, comprising:

a nozzle casing having a peripheral wall which surrounds an interior, the casing having a rear opening, a front opening, and a rotation axis;

a conduit coupler in the interior of the casing, and a conduit securing means in the coupler for securing a liquid supplying conduit to the coupler, the conduit securing means being accessible at the rear opening of the casing, the coupler further having a front wall;

a nozzle block completely within the casing interior forward of and in axial alignment with the conduit coupler, the nozzle block having a rear wall facing the front wall of the coupler, the conduit coupler and the nozzle block being relatively rotatable about the rotation axis, means for connecting the casing and nozzle block such that rotation of the nozzle casing with respect to the conduit coupler causes relative motion of the nozzle block and and conduit coupler;

a plurality of different spray generating apertures defined in and extending through the nozzle block from the rear wall thereof toward the front opening of the nozzle casing and discharging into the interior of the casing, the apertures having inlets at the rear wall of the nozzle block and these inlets being spaced apart along an imaginary circle on the rear wall; and

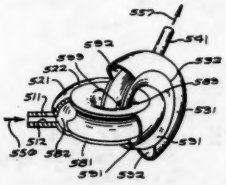
a liquid passageway in the coupler, the passageway having a liquid outlet which is sealingly disposed against the rear wall of the nozzle block, eccentric relative to the rotation axis in a manner permitting the liquid outlet to be placed in sealed liquid flow communication with any selected one of the spray apertures upon rotation of the conduit coupler and the nozzle casing relative to one another.

4,976,468

CONNECTIVE JOINT WITH INTERLOCKING RING STRUCTURES, ADAPTABLE FOR WATER CONDUCTION

Vladimir Shpigel, Brooklyn, N.Y., assignor to Amrus Corporation, New York, N.Y.

Division of Ser. No. 59,966, Jun. 9, 1987, Pat. No. 4,845,603.
This application Jun. 29, 1989, Ser. No. 373,997
Int. Cl.[5] B05B *15/08*
U.S. Cl. 239—587 **12 Claims**



9. A connective joint providing a rotational component of relative motion of two articles, and for use in transmitting a fluid current between the articles, and comprising:

a pair of interlocked structures, each:

having a generally arched body surrounding an aperture,

having a minor cross-section and a major circumference, the minor cross-section of each structure being sized, along at least a segment of its major circumference, to fit through the aperture of the other structure, and

being movably mounted so that the interlocked structures are constrained to mutually arcuate trajectories passing through each other;

each structure having connection means for securing that structure to one of such two articles respectively;

first means for conducting such fluid current between each of the structures and a respective one of such two articles;

second means for conducting such fluid current along paths within the structures respectively; and

third means for conducting such fluid current along a path between the two structures.

4,976,469

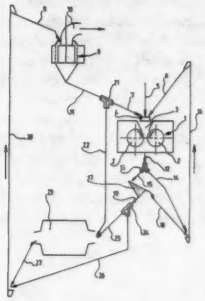
METHOD OF CRUSHING AND COMPACTING ANY MINERAL MATERIAL WHATSOEVER AND SYSTEM FOR CARRYING OUT THIS METHOD

Maurice Paliard, Saint Heand; Jean-Marc Martin, Paris; Francis Cochet, Lezinnes, and Benoit Valdelievre, Montelimar, all of France, assignors to CLE, Courbevoie, France

Filed Jul. 20, 1989, Ser. No. 382,209
Claims priority, application France, Jul. 22, 1988, 8809975
Int. Cl.[5] B02C *25/00*
U.S. Cl. 241—24 **6 Claims**

1. A method of crushing and compacting any mineral material, especially brittle material, for instance cement clinker and of the type consisting in preconditioning this material before pounding it through crushing in a roll press, wherein the improvement consists in that the preconditioning of the material consists in mixing various forms of the material feeding the press to adjust its density in bulk to a value ranging between

about 0.60 D_p and 0.90 D_p, D_p being the density of the agglomerated or compacted product issuing from the press in order to

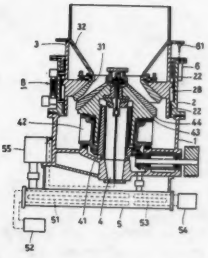


achieve a stable operation of the latter and therefore to stabilize the instantaneous power consumption required by the crushing operation.

4,976,470
CONE CRUSHER

Kazuaki Arakawa, Osaka, Japan, assignor to Kurimoto, Ltd., Osaka, Japan

Filed Jun. 12, 1989, Ser. No. 365,017
Claims priority, application Japan, Mar. 30, 1989, 1-80985
Int. Cl.[5] B02C *2/04*
U.S. Cl. 241—37 **4 Claims**



1. A cone crusher for crushing raw material, such as ore, comprising:

a mantle;

a bowl liner;

a cylinder;

a cylindrical member to which the bowl liner is fixed to be mounted above said mantle, said cylindrical member being slidably and rotatably engaged with said cylinder, forming thereby an internal surface of an upper frame;

a hydraulic pressure generating device;

a plurality of annular oil chambers, internally provided on a sliding surface between the cylinder and the cylindrical member, said oil chambers being vertically oriented and each being switchably connected to said hydraulic pressure generating device;

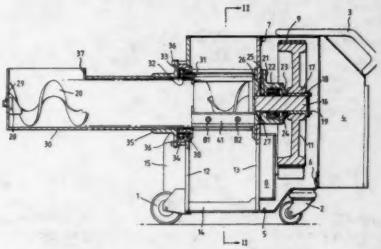
a flexible pipe; and

a pressure control valve provided in parallel with said hydraulic pressure generating device, forming a bypass to apply, through said flexible pipe, a certain pressure at all times to only one oil chamber at a time.

4,976,471
MILL

Lennart Holgersson, Smedgartan 44, 330 10 Bredaryd, Sweden

PCT No. PCT/SE88/00245, § 371 Date Sep. 29, 1989, § 102(e) Date Sep. 29, 1989, PCT Pub. No. WO88/08751, PCT Pub. Date Nov. 17, 1988
PCT Filed May 13, 1988, Ser. No. 411,528
Int. Cl.[5] B02C *18/18*
U.S. Cl. 241—73 **10 Claims**



1. An apparatus in a machine for comminuting plastic, wood, or similar material into smaller pieces, for example, plastic into granules and wood into chips, comprising:

knives (41) disposed at one end of a feeder screw (20), said knives rotating with said screw and cooperating with a number of relatively fixed counter knives (41) and a grid (57),

each of said knives having a seat (40) which extends between an end plate (26) and a ring (31) at a proximal end of said screw (20), a knife blade (41) adapted to the configuration of said sear (40), and a bar (42) for fixedly clamping said knife blade (41) in said seat (40).

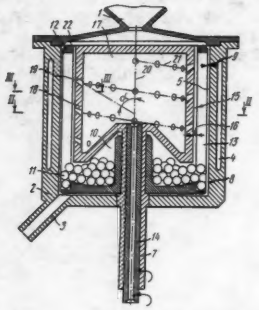
4,976,472
CENTRIFUGAL MILL

Vladimir I. Kozlov, ulitsa Karbysheva, 26, kv. 7; Vladimir F. Redkin, ulitsa Kirenskogo, 24, kv. 230; Sergei A. Kozyrev, prospekt Mira, 107, kv. 10; Vasily N. Borisov, ulitsa Baumana, 14, kv. 14, all of Krasnoyarsk; Vladimir V. Boldyrev, ulitsa Tereshkovoi, 38, kv. 29, Novosibirsk; Fedor R. Krebel, ulitsa Kirenskogo, 24, kv. 216, and Nikolai M. Rubtsov, prospekt Krasnoyarsky rabochy, 127a, kv. 196, both of, Krasnoyarsk, all of U.S.S.R.

PCT No. PCT/SU87/00091, § 371 Date Apr. 15, 1989, § 102(e) Date Apr. 15, 1989, PCT Pub. No. WO89/01824, PCT Pub. Date Mar. 9, 1989
PCT Filed Aug. 25, 1987, Ser. No. 347,890
Int. Cl.[5] B02C *17/16*
U.S. Cl. 241—172 **11 Claims**

1. A centrifugal mill comprising a feeder secured on a housing having a working surface which has ribs and which accommodates a separator mounted on a shaft and arranged coaxially inside the housing to define an annular clearance with the working surface of the housing and having a cavity and a plurality of through holes in a side wall, and balls placed in the cavity of the separator, some of the balls interacting during rotation of the separator with the ribs of the housing via the through holes in the side wall of the separator, characterized in that the cavity of the separator accommodates a baffle defining with the separator an annular clearance of between 0.1 and 1.0

times the diameter of each ball, the annular clearance between the separator and working surface of the housing amounting to



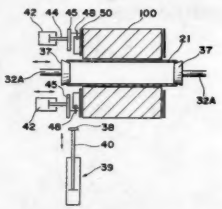
between 0.1 and 0.5 times the diameter of each ball, whereas through holes in the separator have the form of slots.

4,976,473

WINDING APPARATUS FOR SHEET-SHAPED MOLDING MATERIAL

Yasuhiro Tsujimoto; Masayuki Kurita, and Masaru Aoki, all of Shimizu, Japan, assignors to Takeda Chemical Industries, Ltd., Osaka, Japan

Filed Jan. 31, 1989, Ser. No. 305,104
Claims priority, application Japan, Feb. 4, 1988, 63-26176
Int. Cl.[5] B65H *18/04, 19/28, 23/00*
U.S. Cl. 242—67.1 R **5 Claims**



1. A winding apparatus for winding a sheet-shaped molding material of a compound composed of a paste-like resin material impregnated with a solid material such as glass fiber or the like and the compound having bottom and top carrier films, around a winding core tube into a roll of molding material, said apparatus comprising:

a frame means;

at least one winding means on said frame means, said winding means having a support means for supporting a winding core tube at a winding position therein, said support means having chucks which are detachably engagable with the opposite ends of a winding core tube for supporting the winding core tube therebetween in the winding position, and a driving mechanism for driving said chucks into and out of engagement with the winding core tube for supporting and releasing the winding core tube, respectively; and

restricting means for restricting the movement of the sheet-shaped molding material in the direction of the width thereof during winding, said restricting means including side plates movably mounted along a winding core tube held in the winding position by said chucks for movement to and away from positions corresponding to the right and left sides of a roll of sheet-shaped molding material being wound on a winding core tube in the winding position for restricting movement of the sheet-shaped molding material in the width direction to prevent slippage during winding onto a winding core tube, and a side plate driving means connected to said side plates for moving said side plates to and away from said positions; and

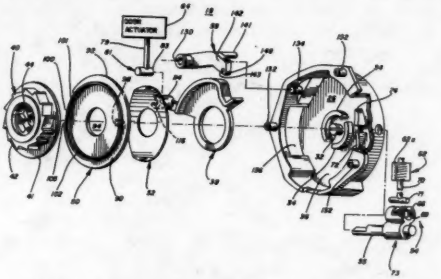
guide sheet means positioned adjacent said winding means for supplying a guide sheet and winding a leading end thereof onto a winding core tube prior to the start of winding of the sheet-shaped molding material, whereby the leading end of the sheet-shaped molding material is engaged by said carrier films of said sheet-shaped molding material for guiding the leading end of the sheet-shaped molding material onto the winding tube core, and means for cutting the guide sheet after the sheet-shaped molding material has started to be wound on the winding core tube.

4,976,474

SELECTIVE ACTIVE OVERT COMFORT SYSTEM

Gerald A. Doty, Crown Point, Ind., and Eric T. Johnson, Momence, Ill., assignors to Occupany Safety Systems, Inc., Olympia Fields, Ill.

Continuation-in-part of Ser. No. 176,304, Mar. 31, 1988. This application Apr. 11, 1989, Ser. No. 336,100
Int. Cl.[5] B60R *22/34*
U.S. Cl. 242—107.7 **10 Claims**



1. In a seat belt retractor for rewinding a seat belt said retractor comprising:

a reel;

a first biasing means for biasing the reel to retract and to rewind the belt on the reel;

an emergency locking means for locking the belt against protraction at the time of an accident;

a tension-relieving means for relieving a tension force positionable in a tension-relieving position applied by the belt onto an occupant body in a vehicle by blocking belt retraction and rewinding movement of the reel and positionable in a release position in which the tension-relieving means is inoperable from relieving belt tension;

a manual overt actuator for shifting the tension-relieving means to an activated position from which said tension-relieving means may be shifted to the tensionless position by belt protraction; and,

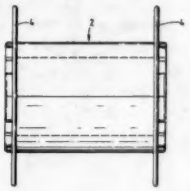
means operable by belt protraction beyond a predetermined distance to shift the tension-relieving means from its tension-relieving position to its release position allowing the biasing means to rewind the belt onto the reel, a detent means to detent the tension-relieving means in the release position allowing belt rewind by the biasing means, the tension-relieving means comprising a first rotatable member operable to shift from a detented position in which the first rotatable member is detented by the detent means to the activated position, said first rotatable member movable from said activated position by a subsequent belt protraction to said tension-relieving position.

4,976,475

KNOCK DOWN SPOOL

Markku R. Björkqvist, Värnamo, Sweden, assignor to AB Varnamo Gummifabrik, Varnamo, Sweden

Filed May 18, 1989, Ser. No. 353,416
Claims priority, application Sweden, May 19, 1988, 88018783
Int. Cl.[5] B65H 75/22
U.S. Cl. 242—115 13 Claims



1. A knock down spool comprising:

a substantially cylindrical central member comprising a cellular plastic and including at least two sections releasably connected with each other in a substantially axially extending plane;

radially outwardly directed lugs extending along portions of the periphery of said central member and forming gaps between said lugs;

a pair of grooves provided in said central member, one groove at each opposite end portion of said central member, said grooves providing axially and radially oriented surface portions, said grooves extending in the direction of the ends of said central member restricted by said outwardly directed lugs;

a pair of radially projecting end flanges releasably inserted each onto one end portion of said central member for holding said at least two sections of said central member in a connected position;

radially inwardly directed lugs provided on said end flanges, said inwardly directed lugs being insertable into said grooves through the gaps between the radially outwardly directed lugs of said central member and being introduceable behind said radially outwardly directed lugs by rotating the end flanges in relation to said central member;

a plurality of deformable locking means formed in the bottoms of said grooves within the areas of the radially outwardly directed lugs, each of said deformable locking means cooperating with corresponding locking means formed at the radially, inwardly directed lugs of the end flanges for providing a releasable locking of the end flanges in a correct rotational position in which the lugs of the end flanges are positioned behind the lugs of said central member.

4,976,476

MANUAL AND ELECTRICAL MECHANISM FOR UNLOCKING A BOLT

David C. Cross, Shepherdsville, and William G. Holloway, Lebanon Junction, both of Ky., assignors to Tonks, Inc., Subsidiary of Newman Monarch Hardware & Manufacturing Co., Inc., Shepherdsville, KY.

Filed Jun. 13, 1989, Ser. No. 366,506
Int. Cl.[5] E05B 15/02
U.S. Cl. 292—92 15 Claims

1. An actuator mechanism for a latch having a bolt movable between a projected locking position and a retracted unlocking position and spring means urging the bolt to the projected position, comprising:

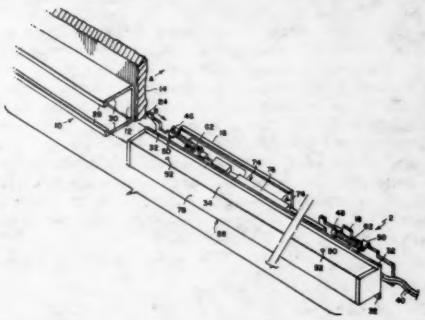
a linkage connector adapted to be connected to a drawbar fastened to a latch bolt;

means mounting said connector for substantially linear movement between a first bolt projecting position and a second bolt retracting position;

a manually-operable pushbar channel-shaped in cross section;

a first means connecting said pushbar to said connector for moving the latter between said first and second positions;

solenoid means housed at least partially in said pushbar, and including an armature movable between a projected position corresponding to said connector first position and a retracted position corresponding to said connector second position and electric coil means which when energized moves said armature to said retracted position thereof; and



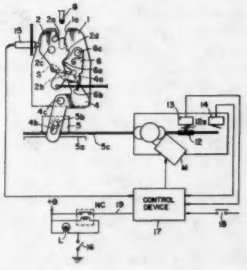
second means connecting said armature to said connector to move the latter from said first position to said second position, said first connecting means including a first lost motion connection permitting movement of said connector between said first and second positions by said solenoid means independently of movement by said pushbar and said second connecting means including a second lost motion connection permitting movement of said connector between said first and second positions by said pushbar independently of movement by said solenoid.

4,976,477

DEVICE FOR LOCKING TRUNK LID OF MOTOR VEHICLE

Akihiro Nakao, Tokyo, Japan, assignor to Fuji Jukogyo Kabushiki Kaisha, Tokyo, Japan

Filed Sep. 25, 1989, Ser. No. 412,147
Claims priority, application Japan, Sep. 30, 1988, 63-128461
Int. Cl.[5] E05C 3/26
U.S. Cl. 292—201 4 Claims



1. A device for locking a trunk lid of a motor vehicle comprising: a striker secured to said trunk lid; a base plate secured to a trunk of the vehicle and provided with a guide slot for

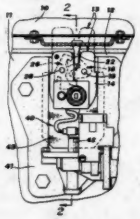
receiving said striker when the lid is closed; a latch member rotatively supported on said base plate and provided with an engaging slot for functioning cooperatively with said guide slot to hold said striker; a detent lever pivotally supported on the base plate and being engageable with said latch member to hold the latch member in a locking position; a locking/unlocking lever pivotally supported on the base plate for rotating the latch member into said locking position and alternately, by way of said detent lever, to rotate the latch member into an unlocking position; a motor for moving said locking/unlocking lever to any of three positions respectively for rotating the latch member to said locking position, a neutral position, and said unlocking position; control means for controlling said motor in the operation thereof; means for detecting arrival of the locking/unlocking lever at positions corresponding respectively to said locking position and said neutral position and transmitting respective corresponding detection signal to said control means; a striker monitoring sensor for detecting, during the opening or closing of the trunk lid, entrance of the striker into said engaging slot to transmit a corresponding detection signal to the control means; and an electric power source for operating said control means, said device further comprising a trunk switch which is closed when the trunk lid is open; and means for making the control means inoperative in receiving the detection signal from the striker monitoring sensor when the trunk switch is closed.

4,976,478

RELEASE FOR CLOSURE PANEL PULL DOWN MECHANISM

Allan C. Acciaccs, Mt. Clemens, and Bela Gergoe, Birmingham, both of Mich., assignors to General Motors Corporation, Detroit, Mich.

Filed Dec. 4, 1989, Ser. No. 445,327
Int. Cl.[5] E05B 65/19
U.S. Cl. 292—201 **2 Claims**



1. In a vehicle body including a compartment panel spring-loaded for movement between open and closed positions with respect to a compartment defined by a body panel, a latch and pull down mechanism comprising:

a striker mounted on one of the panels;

a latch assembly having a latch bolt movable to an unlatched position and a detent lever for holding the latch bolt in the latched position for latching engagement with the striker;

a motorized pull down unit mounting the latch assembly on the other of the panels for movement between an extended position where the latch bolt of the latch assembly is engageable by the striker to latch the panels together upon partial closing movement of the closure panel, and a retracted position in which the closure panel is in the closed position;

remote opening means actuatable by a user for selectively operating the motorized pull down unit to move the latch assembly from the retracted position toward the extended position,

and cam means acting in response to motorized movement of the latch assembly from its retracted position toward its extended position to cam the detent lever to a position releasing the detent lever from the latch bolt,

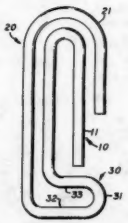
said cam means including a cam follower lever mounted on the latch assembly and being operably associated with the detent lever, said cam follower lever projecting into engagement with a cam fixedly mounted on the other of the panels and being activated by the cam upon movement of the latch assembly from the retracted position to the extended position whereby the latch bolt is returned to the unlatched position thereby disconnecting the latch assembly from the striker and freeing the closure panel for spring-loaded movement of the open position.

4,976,479

DOORSTOP

Lawrence M. Lunn, 6125 U.S. Hwy. 31, S., Indianapolis, Ind. 46227

Filed Feb. 27, 1989, Ser. No. 315,818
Int. Cl.[5] E05C 17/54
U.S. Cl. 292—343 **16 Claims**



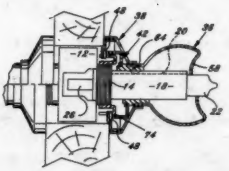
1. In a doorstop formed from a single, resilient, bent rod, including an upwardly urged, door-engaging portion and a base portion, the improvement wherein only a single U-shaped portion is located between the door-engaging portion and the base portion with its central axis laying transverse to the central axis of the door-engaging portion, wherein the single U-shaped portion forms the only transition between the door-engaging portion and base portion.

4,976,480

CYLINDRICAL LOCKSET HAVING QUICK MOUNT MEANS ACCOMMODATING VARIOUS THICKNESS OF DOORS

David Dixon, Monroe, N.C., and Walter E. Surko, Jr., Southington, Conn., assignors to Yale Security Inc., Monroe, N.C.

Filed Apr. 5, 1990, Ser. No. 505,188
Int. Cl.[5] E05B 3/00
U.S. Cl. 292—353 **9 Claims**



1. A lockset adapted to be quickly mounted on doors of different thicknesses comprising:

a. a latchbolt retractor housing,

b. a latchbolt retractor within said housing,

c. an inside sleeve exteriorly threaded and extending longitudinally outward from the housing,

d. a nut having interior threads being threaded onto the

inside sleeve and having respective ends proximate and remote from the housing, the nut having an outer peripheral surface formed with peripherally spaced cutouts, each cutout comprising an inward opening at the remote end and a pair of steps facing and progressively closer to the proximate end of the nut, the steps from each opening leading in the same peripheral direction of the nut, each of the steps comprising a tread generally formed radial of the nut and a riser following each tread and disposed generally longitudinal of the nut,

e. a handle spindle operatively connected to the latchbolt retractor and disposed centrally of the sleeve and extending longitudinally outward thereinside,

f. an inside handle assembly comprising:

1. an inside handle having a shank keyed for rotation with the spindle and movable therealong,
2. an annular rose scalp extending outward from the shank,
3. an annular rose liner being secured within the rose and rotatably secured to the handle and having radially inward tabs spaced about its periphery structured to align with the peripheral openings in the remote end of the nut

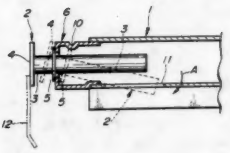
whereby in installing the lockset on the door, the inside handle assembly may be telescoped over the spindle so that the tabs are received into the openings in the periphery of the nut and the rose may be turned bringing the tabs into engagement with the risers closest to the proximate end of the nut that the width of the door will permit and further turning tightens the nut on the inside sleeve so that the tabs are engaged by the treads preceding the engaged risers to pull the rose scalp and liner snugly against the door.

4,976,481

VEHICLE BODY FRONT OR REAR END STRUCTURE FOR MOUNTING SHOCK-ABSORBING TYPE BUMPER

Noboru Yoshihira, Ayase, Japan, assignor to Nissan Motor Company, Ltd., Japan

Filed Feb. 21, 1989, Ser. No. 312,873
Claims priority, application Japan, Feb. 22, 1988, 63-22123[U]
Int. Cl.[5] B60R *19/34*
U.S. Cl. 293—133 **7 Claims**



1. A vehicle body construction, comprising:

a side member, having a first end;

a bracket, provided at said first end of said side member;

a bumper; and

a shock absorber, interposed between said bumper and said bracket to interconnect the same;

said bracket being constructed so that a maximum compressive load thereof is smaller than that of said side member and larger than a maximum reaction force of said shock absorber, wherein

said shock absorber has an inner end portion received within said side member,

said side member has a lower wall formed with an opening of a shape and size suitable for receiving said inner end portion of the shock absorber therethrough when the shock absorber is forcibly turned in a predetermined direction, and

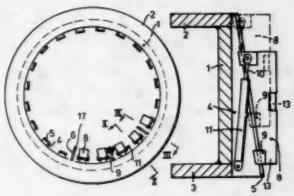
said bracket is tubular in shape and is formed with a bead for causing said shock absorber to turn in said predetermined direction that enables said inner end portion of said shock absorber to go into said opening in response to a forcible collapsing of said bracket.

4,976,482

APPARATUS FOR CLAMPING PIPE OR TUBE

Theodorus G. Wilhelmus van Steijn, Linschoten, Netherlands, assignor to P. Boer & Zn. B.V., Netherlands

Filed Apr. 6, 1989, Ser. No. 334,306
Claims priority, application Netherlands, Apr. 7, 1989, 8800890
Int. Cl.[5] B66C *1/44*
U.S. Cl. 294—102.1 **6 Claims**



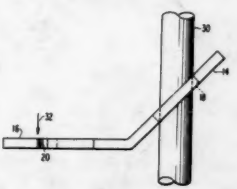
1. Apparatus for clamping a pipe or tube, comprising a cylindrical sleeve (1) onto which at the interior surface at regular angular distances a number of counter wedges (4) with guide tracks (5) have been arranged, wedges (8) comprising inwardly directed buttons (16), wherein the wedges are free to travel over the guide tracks in the axial direction of the sleeve, a means (11) connected to at least one of the wedges for driving said at least one of the wedges in order to move the buttons of said at least one of the wedges in an inward radial direction perpendicular to the axial direction of the sleeve, and engaging means arranged to move synchronously with the wedges, wherein the engaging means consists of guide blocks (13) arranged in a plane substantially perpendicular to the axial direction of the sleeve, each of said guide blocks having a projection (14) on one side of the wedge and a recess (15) on the other side, wherein the guide blocks are connected together in a continuous loop with the projection of each of the guide blocks reciprocably attached in the recess of the guide block adjacent thereto, so that each of the projections is free to reciprocate within the recess in which it is attached as the wedges (8) are moved in the radial direction in relation to the interior surface of the sleeve (1).

4,976,483

STAKE DRIVING TOOL

Isaiah V. Cunningham, 431 McKinley Ave., Charleston, W. Va. 25314

Filed May 30, 1989, Ser. No. 357,927
Int. Cl.[5] B66C *1/22*
U.S. Cl. 294—92 **1 Claim**



1. A stake driving tool comprising a plate having first and second planar portions each disposed in adjacent planes at an

angle of approximately 130° relative to each other about a transverse line,

a laterally extending slot disposed in one of said planar portions substantially parallel to said line and

a second laterally extending slot disposed in said other planar portion substantially parallel to said line wherein said slots extend into said plate from opposite directions, each of said slots having substantially opposed edges spaced apart a distance substantially greater than the width of a stake to be driven into the ground and adapted to frictionally engage opposite sides of said stake when said stake extends vertically through said slot with the other portion of said plate extending substantially horizontally outwardly from said stake for downward engagement by foot pressure to drive said stake into the ground.

4,976,484

WORK POSITIONING DEVICE FOR ASSEMBLY LINE

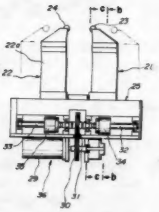
Minoru Nomaru, Yokohama, and Atsushi Takahama, Yokosuka, both of Japan, assignors to Nissan Motor Co., Ltd, Yokohama, Japan

Filed Dec. 9, 1988, Ser. No. 282,158

Claims priority, application Japan, Dec. 10, 1987, 62-187091[U]

Int. Cl.[5] B25J *15/08*

U.S. Cl. 294—119.1 **2 Claims**



1. In a device for supporting a work piece

first and second pincer members, said first and second pincer members being disposed on a base member in a manner to be slidably movable toward and away from each other, said first pincer being elongatable;

first and second work receiving members, said first and second work receiving members being disposed at the upper ends of said first and second pincer members;

first drive means associated with said first and second pincers for moving said first and second pincers toward and away from one another, said first drive means including a device which converts rotational motion into linear motion;

second drive means associated with said first pincer for selectively elongating the same; and

a location device comprising a probe mounted adjacent said first and second pincers and operatively connected with a servo device to enable the probe to be extended to engage a location aperture formed in the work piece supported on said device.

4,976,485

TRIBUNE VEHICLE

Gilbert R. Jonckheere, Rue de Ménin 408, B - 7700 Mouscron, Belgium

Filed Nov. 21, 1989, Ser. No. 439,335

Claims priority, application Belgium, Nov. 22, 1988, 8801316

Int. Cl.[5] B60P *3/34*

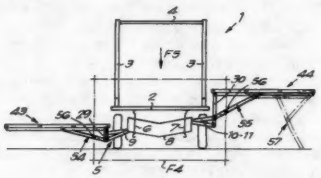
U.S. Cl. 296—26 **17 Claims**

1. A tribune vehicle comprising:

a fixed floor forming a vehicle frame;

a pair of upright floor parts, positioned one on each side of the fixed floor and capable of being folded down to form a platform; and

a means for operatively connecting one of the floor parts to the fixed floor for placing said one of the floor parts on a



level higher than the fixed floor and for operatively connecting the other floor part to the fixed floor for placing the floor part on a level lower than the fixed floor when the pair of floor parts are folded down to form a platform.

4,976,486

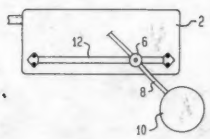
SUN VISOR

Mahassen S. Rifaat, 636 Valley Rd., Watchung, N.J. 07060

Division of Ser. No. 250,765, Sep. 28, 1988. This application Apr. 20, 1990, Ser. No. 511,446

Int. Cl.[5] B60J *3/00*

U.S. Cl. 296—97.8 **15 Claims**



1. A visor assembly for a vehicle, said visor assembly comprising a first visor body; a second visor body; and means for coupling said first and second visor bodies, said means for coupling comprising:

first guide bar means attached to said first visor body;

hinge body means coupled to said first guide bar means so as to permit sliding movement of said hinge body means relative to said first guide bar means;

second guide bar means coupled to said second visor body and coupled to said hinge body means so as to permit sliding movement of said second guide bar means relative to said hinge body means; and

said hinge body means comprising means for permitting rotation of said second guide bar means about said hinge body means.

4,976,487

COLLAPSIBLE CAR WINDOW CANOPY APPARATUS

Frank Ramos, 311 Olive Ave., Wahiawa, and Robert T. Lee, 242 California Ave., Honolulu, both of Hi. 96786

Filed Sep. 19, 1989, Ser. No. 410,170

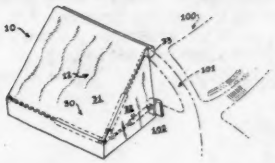
Int. Cl.[5] B60J *3/00*

U.S. Cl. 296—152 **6 Claims**

1. A collapsible canopy apparatus for use in combination with the upper and lower window frame portions of a conventional vehicle door wherein the canopy apparatus comprises:

a cover unit including a cover member having a pair of side panels and a generally elongated rectangular top panel provided with an extension flap; wherein, the top panel and the extension flap are provided with cooperating securing means; wherein, the cooperating securing means allows the extension flap to be formed into a loop with the

top panel wherein said loop surrounds the upper window frame portion of said vehicle; and,



a framework unit comprising a framework member including a Plurality of telescoping leg members wherein said framework member is operatively engaged to the lower window frame portion of said vehicle.

4,976,488

MOTOR-VEHICLE WITH SLIDING DOORS

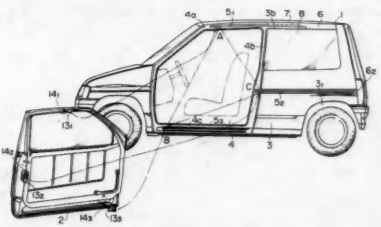
Keiichi Asai; Chizuko Mochizuki, both of Hamamatsu, and Kazunobu Hori, Kosai, all of Japan, assignors to Suzuki Motor Company Limited, Shizuoka, Japan

Filed Aug. 23, 1989, Ser. No. 398,828

Claims priority, application Japan, Aug. 29, 1988, 63-214685; Aug. 29, 1988, 63-214689; Sep. 6, 1988, 63-222649

Int. Cl.[5] B00J *5/06*

U.S. Cl. 296—155 **4 Claims**



1. A motor vehicle including a motor vehicle body defining a front door opening including a front pillar extending slanting forwardly and downwardly; a sliding door positionable in said front door opening, said sliding door having an upper edge and a lower edge, said upper edge being shorter than said lower edge, said front door including an inclined surface extending from a front end of said upper edge downwardly and forwardly in a slantwise direction, said sliding door including an upper guide roller, a central guide roller and a lower guide roller, said rollers being engaged with and supported by an upper, a central and a lower guide rail respectively, said guide rails being supported on said vehicle body.

4,976,489

AIR VELOCITY RESPONSIVE SELF DEPLOYING FLEXING AIR DAM

Richard R. Lovelace, Clarkson, Mich., assignor to General Motors Corporation, Detroit, Mich.

Filed Mar. 26, 1990, Ser. No. 498,677

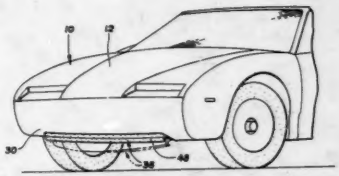
Int. Cl.[5] B62D *37/02*

U.S. Cl. 296—180.1 **4 Claims**

1. An air dam for attachment to the underside of a motor vehicle and extending downwardly therefrom into proximity with the road surface and potential interference with curbs or like obstructions extending above the road surface, comprising:

a generally rectangular flexible sheet having an upper edge and a lower edge defining an air deflecting surface therebetween; and

means attaching the upper edge of the flexible sheet on the underside of the motor vehicle with the air deflecting surface cantilevered generally horizontally forward from the attaching means so that the lower edge is spaced substantially above the road surface in an undeployed position and with the air deflecting surface being disposed in the oncoming airstream so that the flexible sheet is flexed downwardly progressively in response to the force



of air pressure impinging on the air deflecting surface to a full deployed position whereby the lower edge remains poised substantially above the road surface to clear obstructions extending above the road surface when the vehicle is traveling at low speeds and extends downwardly into substantial air defecting proximity with the road surface at high vehicle speed.

4,976,490

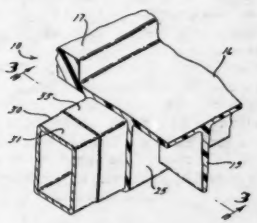
REINFORCED COMPOSITE STRUCTURE

Derek F. Gentle, Bloomfield Hills, Mich., assignor to Ford Motor Company, Dearborn, Mich.

Filed Oct. 5, 1988, Ser. No. 253,654

Int. Cl.[5] B62D *25/08*

U.S. Cl. 296—183 **12 Claims**



1. A reinforced FRP composite structure comprising:

a filament reinforced plastic body having (i) a platform portion forming a generally planar surface and horizontal upper surface area and (ii) at least one hollow beam portion unitary with said platform portion, extending along and downwardly from a lower surface of said platform portion to strengthen said platform portion; a hollow tube inside said hollow beam portion of said filament reinforced plastic body; and a coating of resilient material on an elongated exterior surface of said tube, sandwiched between said exterior surface and said filament reinforced plastic body.

4,976,491

COWL AND DASH PANEL ASSEMBLY FOR A FRONT BODY CONSTRUCTION OF A MOTOR VEHICLE

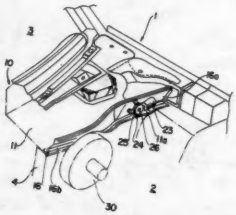
Teruo Hashimoto, Higashihiroshima; Yoshio Fukushima; Toshifumi Suzuki, both of Hiroshima, and Hiroshi Minamoto, Hiroshima, all of Japan, assignors to Mazda Motor Corporation, Hiroshima, Japan

Filed May 1, 1989, Ser. No. 345,709

Claims priority, application Japan, Apr. 30, 1988, 63-59007[U]

Int. Cl.[5] B62D *25/08*

U.S. Cl. 296—192 10 Claims



1. An assembly for a front body construction of a motor vehicle, said assembly comprising:

a lower dash panel for separating an engine compartment and a cabin;

a cowl portion mounted on said lower dash panel for supporting a lower end of a windshield;

said cowl portion including an upper dash panel attached to an upper end of said lower dash panel, thereby forming a bottom wall of said cowl portion, and a front cowl panel having a lower end attached to an upper face of said upper dash panel, thereby forming a front wall of said cowl portion;

said front cowl panel having an upper end positioned forwardly of said lower end thereof throughout an entire dimension thereof in a lateral direction of a vehicle body of the motor vehicle;

said front cowl panel having, with respect to said lateral direction of the vehicle body of the motor vehicle, opposite sides and a central portion between said opposite sides; and

at least one of said opposite sides of said front cowl panel being disposed rearwardly of said central portion of said front cowl panel, with respect to a longitudinal direction of the vehicle body, and said lower end of said front cowl panel, at said at least one opposite side thereof, being disposed at a location that is not further forward than that of said upper end of said lower dash panel, with respect to said longitudinal direction of the vehicle body;

thereby defining a space for an auxiliary unit provided forwardly of said front cowl panel, with respect to said longitudinal direction of the vehicle body, and at said at least one of said opposite sides of said front cowl panel.

4,976,492

FOLDABLE OUTDOOR CHAIR

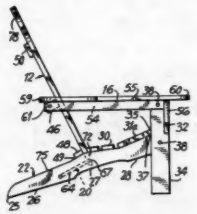
Sidney Ziegler, Mongaup Valley, N.Y., assignor to Budoff Outdoor Furniture, Inc., Monticello, N.Y.

Filed Aug. 28, 1989, Ser. No. 399,217

Int. Cl.[5] A47C *4/08*

U.S. Cl. 297—31 19 Claims

1. A foldable chair movable between a position of use and a collapsed position, comprising a combined seat bottom and rear leg assembly including a seat bottom and laterally spaced side rails; a seat back assembly including a seat back operatively connected to said side rails, said seat back assembly being in abutting engagement with said seat bottom in the use position; a front leg assembly including a pair of laterally spaced front legs operatively connected to said seat bottom and rear leg assembly; a pair of arm rests operatively connected to said front leg assembly and said seat back assembly; and a lever assembly to facilitate folding, including a pair of levers, each lever being pivotally connected to the seat back assembly at a first location, said first location defining a first pivot point which is positioned below said seat bottom in the use position of the chair, each said lever also being pivotally connected to a respective one of said side rails at a second



location at an opposite end of each said lever from said first location, said second location defining a second pivot point which is positioned below the center axis of said side rails; said chair being movable between said use position and an intermediate position, wherein said seat back is initially raised upwardly and pushed forwardly such that said lever is pivoted clockwise about said first pivot point, and its collapsed position, wherein said lever is pivoted counterclockwise about said second pivot point.

4,976,493

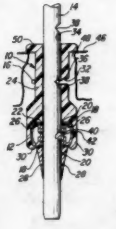
VEHICLE HEADREST POST GUIDE

John W. Frankila, 5140 Sunset, Jackson, Mich. 49203

Filed Feb. 27, 1989, Ser. No. 385,514

Int. Cl.[5] A47C *7/36*

U.S. Cl. 297—410 8 Claims



1. A guide for mounting a headrest post on an automotive seat structural tube having aligned apertures on opposite surfaces, wherein the post has a plurality of spaced detent notches, the guide comprising:

an elongated plastic guide body having a seat upholstery-engaging flange on one end,

an intermediate shank including a shoulder engaging the tube adjacent one aperture,

a locking tang on the other end for engaging one side of the tube adjacent the other aperture to cooperate with the shoulder and lock the guide to the tube upon insertion of the guide through the apertures,

a finger extending from one side of the shank to embrace the tube intermediate the apertures to prevent rotation of the guide relative to the tube,

a central through bore for receiving the post,

a groove in the shank intersecting the bore, and

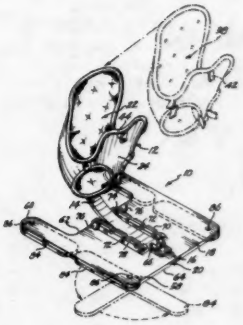
a spring normally occupying the groove for engagement with the post detent notches to position the post within the guide and being movable out of the bore to enable repositioning of the post, whereby the guide may be inserted through the apertures after the automotive seat is trimmed.

4,976,494

FORWARD RECUMBENT POSTURE POD

Robert F. L. Polley, Suite 15-A, 1100 University St., Seattle, Wash. 98101

Filed Jul. 26, 1989, Ser. No. 385,725
Int. Cl.[5] A47D *1/00*
U.S. Cl. 297—464 3 Claims



1. An apparatus for bearing an infant's weight in semi-inclined vertical position by supporting the infant's anterior torso, the apparatus comprising:

(a) a base for stabilizing the apparatus;

(b) an arc-shaped spring having a first end tangentially secured to the base and a second end projecting upwardly from the base;

(c) a support member tangentially secured to the second end of the spring and spaced from the base to elevate the infant so as to prevent the infant's limbs from resting on the base, the support member having an anterior portion against which the infant's anterior torso bears, a bottom portion extending outwardly from the anterior portion against which the infant's buttocks bear, and two lateral portions extending outwardly from the anterior portion such that the torso of the infant inclining on the support member is located between the two lateral portions to prevent the infant from sliding to either side off the anterior portion, with the support member allowing substantially unrestricted movement of the infant's head and limbs;

(d) posterior support means attached to the support member for limiting the infant's movement orthogonally away from the anterior portion of the support member;

(e) means for pivotally securing the first end of the spring to the base to allow the spring and support member to pivot between an upright position, in which the anterior portion of the support member is inclined slightly from an orthogonal to the base, and an inclined position, in which the anterior portion of the support member is inclined so as to be approaching a parallel to the base; and

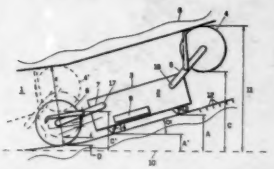
(f) positioning means for selectively positioning the spring and support member in the upright position, the inclined position, and intermediate positions over the range spanning between the upright and inclined positions.

4,976,495

METHOD AND APPARATUS FOR STEERING A MINING MACHINE CUTTER

Foster Lewins, Mickleover, and Timothy S. Gammons, Ripley, both of England, assignors to Coal Industry (Patents) Limited, London, England

Filed Aug. 8, 1989, Ser. No. 390,831
Claims priority, application United Kingdom, Aug. 11, 1988, 88 19056.6
Int. Cl.[5] E21C *35/12, 35/24*
U.S. Cl. 299—1 7 Claims



1. A method of steering a trailing drum of a double-ended mining machine in which the mining machine is of the kind having a body arranged to be progressed along a mineral face being cut, the body having at either end a ranging arm pivotally mounted on the body and each arm carrying a rotatable cutting drum, one drum being a leading drum or the other the trailing drum, a plurality of sensor means being mounted on the machine and being adapted to measure different parameters of the mining operation and to generate electrical signals representative of said parameters, a first of said sensor means being arranged to measure the along face angle or tilt of the machine, second sensor means being arranged to measure the movement and direction of the machine and a third of said sensor means being arranged to measure the positions of the leading one of said arms and a trailing one of said arms with respect to the machine; comprising establishing from the first and second sensor means, electrical signals indicating the direction and movement of the machine and the position of the machine relative to a datum line, establishing from an electrical signal from the third sensor means, and by calculation, the height of the cut roof above the datum line, and storing information derived from said signals in store means: subsequently feeding an output signal to control means of the trailing drum to operate said control means to alter the position of the trailing drum, so as to maintain the steering movement of the trailing drum such that it cuts a floor parallel to the roof cut previously by the leading drum.

4,976,496

VALVE OPENABLE IN RESPONSE TO DISPLACEMENT OF A CUTTING TOOL

Jan-Gunnar Hedlund, Sandviken, and Bengt A. Asberg, Gävle, both of Sweden, assignors to Sandvik AB, Sandviken, Sweden

Filed Jul. 10, 1989, Ser. No. 377,167
Claims priority, application Sweden, Jul. 19, 1988, 8802674
Int. Cl.[5] E21B *10/60;* E21C *35/22*
U.S. Cl. 299—81 15 Claims

1. A holder apparatus adapted to receive a tool for cutting solid material, said holder apparatus comprising:

a holder body containing:

a recess, a forward portion of said recess arranged to receive the tool in such manner that the tool is rearwardly displaceable relative to said housing, and

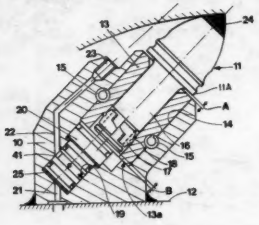
fluid channel means for conducting and discharging fluid in a direction of flow toward a cutting zone of the tool,

valve means comprising:

a valve housing disposed in a rear portion of said recess, said housing including a fluid inlet communicating with an upstream portion of said channel means considered with respect to said direction of flow, and a fluid outlet commu-

nicating with a downstream portion of said channel means,

a valve element mounted in said valve housing for movement between valve opening and valve closing positions, said valve element yieldably biased to said valve closing position and adapted to be displaced to said valve opening



position in response to rearward movement of the tool relative to said housing to enable fluid to be discharged toward the cutting zone,

said valve housing being yieldably biased forwardly and arranged to be displaced rearwardly relative to said recess when rearwardly directed forces acting against said housing overcome forces biasing said housing forwardly.

4,976,497

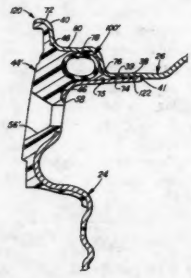
VEHICLE WHEEL CONSTRUCTION

Charles C. Post, Haslett, and Roger E. Swartz, Holt, both of Mich., assignors to Motor Wheel Corporation, Lansing, Mich.

Filed May 17, 1989, Ser. No. 353,099

Int. Cl.[5] B60B *7/00*

U.S. Cl. 301—37 R **30 Claims**



1. A composite styled wheel including in combination a metallic portion comprising a wheel mounting disc and a rim secured to said disc and adapted to receive a tire thereon, and a composite plastic portion comprising an ornamental overlay disposed adjacent and covering at least part of the outboard face of said metallic portion, said overlay including a molded in-situ body of relatively high density resilient urethane plastic material permanently affixed to said metallic portion, the outboard face of said body being exposed to view from the outboard side of said wheel and having a contour differing from the contour of the covered part of the outboard face of said metallic portion and adapted to provide decorative contour over at least part of the metallic portion of said wheel, said disc having a central aperture and wheel mounting fastener holes therein, said overlay having aperture means registering coaxially with said central aperture and holes in said disc adapted to receive wheel hub and mounting parts therein, said overlay also including plastic insert means having a weight-to-volume ratio much less than that of said body plastic material and being secured to said wheel with at least the major portion of said insert means being disposed radially outwardly from said overlay aperture means, said overlay body plastic material covering said insert means so as to completely embed said insert means in said composite overlay to thereby hide said insert means from view and assist in securement thereof to said wheel.

4,976,498

WHEEL RIM FOR A PNEUMATIC TIRE

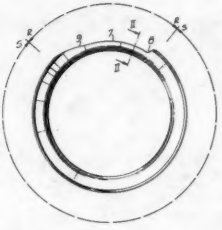
Ian Kemp, Wilnecote, England, assignor to Sumitomo Rubber Industries, Limited, Kobe, Japan

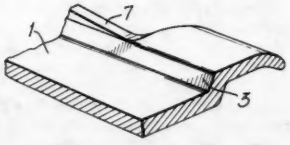
Filed Mar. 29, 1989, Ser. No. 330,176

Claims priority, application United Kingdom, Mar. 30, 1988, 8807509

Int. Cl.[5] B60B *21/10*

U.S. Cl. 301—95 **10 Claims**





1. A one piece wheel rim for a pneumatic tire comprising:

a pair of axially spaced apart tapered bead seats; and

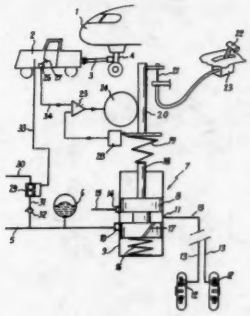
a tire retaining flange located axially outwards of each bead seat, said flange being in its radially inner regions at an angle of A degrees with respect to the radial direction of the wheel and having a reduced height portion of a length of 0.25 to 0.5 times the bead seat circumference and the reduced height being such that the flange height, measured from the heel point, which is the point of intersection of the nominal diameter and the nominal wheel width, is in the range of 0.15 to 0.6 times the height of the remainder of the flange, wherein the portion of the flange which is radially outside the reduced height portion is at an angle B degrees wherein the angle B is greater than angle A with respect to the radial direction so that a tire bead fitted to the wheel rims seats against the flange only to the height of the reduced height portion around the full circumference of the tire.

4,976,499

BRAKING SYSTEM FOR USE WHEN TOWING AN AIRCRAFT ON THE GROUND

Jean Guichard, La Garenne Colombes, and Christian Favre, Massy, both of France, assignors to Messier-Hispano-Bugatti, Montrouge, France

Continuation of Ser. No. 136,856, Dec. 22, 1987, abandoned.
This application Dec. 6, 1989, Ser. No. 449,306
Claims priority, application France, Dec. 26, 1986, 86 18199
Int. Cl.[5] B60T 15/16
U.S. Cl. 303—13 4 Claims



1. A braking system for use when towing an aircraft on the ground with a tractor vehicle, the tractor vehicle being mechanically linked to the aircraft;

the aircraft comprising a brake circuit, said brake circuit comprising a feed pump operable when an engine of the aircraft is running connected by a feed duct to a hydraulic accumulator, wheel brakes, a brake member connecting said hydraulic accumulator to said wheel brakes, and a control means for moving said brake member manually from within the aircraft and activating said wheel brakes, said hydraulic accumulator, said brake member, said wheel brakes and said control means defining an aircraft parking brake circuit that operates without the operation of said feed pump; and

the tractor vehicle comprising a brake control member which controls the braking of the tractor vehicle and the aircraft, and brake means for transmitting a braking signal from said brake control member of the tractor vehicle to said brake member of said aircraft parking brake circuit and for controlling said brake member of said parking brake circuit without operation of said feed pump in parallel with and independently from said control means of said parking brake circuit, whereby braking on the towed aircraft is effected by the parking brake circuit of the aircraft under the control of said brake control member of the tractor vehicle without operation of said feed pump that is used in said braking circuit when aircraft engines are operating and independent of control from the towed aircraft.

4,976,500

ANTI-SPIN HYDRAULIC BRAKE SYSTEM

James A. Cogswell, II, Clarkston, and James L. Coulter, Mt. Clemens, both of Mich., assignors to General Motors Corporation, Detroit, Mich.

Filed Jul. 25, 1988, Ser. No. 223,327
Int. Cl.[5] B60T 8/44
U.S. Cl. 303—110 4 Claims

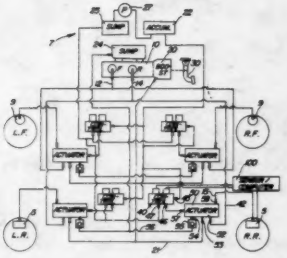
1. A traction control system for a vehicle having a plurality of powered wheels, with at least two of said wheels having fluid actuated brakes, said system also having a master cylinder responsive to the command of a vehicle operator to supply fluid to said wheel brakes, said traction control system in combination comprising:

a first mechanical hydraulic system for selectively supplying pressurized brake fluid to a respective wheel brake or withdrawing brake fluid from said respective wheel brake independent of said master cylinder;

sensing means to determine the rotational displacement of said respective wheel and means to compare said wheel rotational displacement with the displacement of said vehicle and to generate a signal in response thereto;

a first control valve means normally closed allowing communication between said first mechanical hydraulic system and said wheel brake in response to said signal from said sensing means;

isolating valve means, normally opened allowing fluid communication between said respectively wheel brake and said master cylinder to allow operator actuation of said wheel brake, said isolating valve means in a closed position preventing fluid communication between said wheel brake and said master cylinder when said first mechanical



hydraulic system is in communication with said wheel brake, said isolating valve means including a valve member for making contact on a valve seat to prevent fluid communication between said master cylinder and said wheel cylinder, and said isolating valve means including a shuttle valve separate from said valve member for moving said valve member, said shuttle valve communicating with a pressurized line separate from said master cylinder line communicating with said valve member;

hydraulic means to latch said shuttle valve means to a position wherein said valve member is in a closed position when said first mechanical hydraulic system is supplying or withdrawing brake fluid from said brake cylinder; and

hydraulically-actuated means to override said first control valve means to return said isolating valve means to said open position, said hydraulically-actuated means including moving said shuttle valve to allow said valve member to return to an open position whereby there is again fluid communication between said master cylinder and said brake cylinder and whereby said operator can again control said wheel brakes.

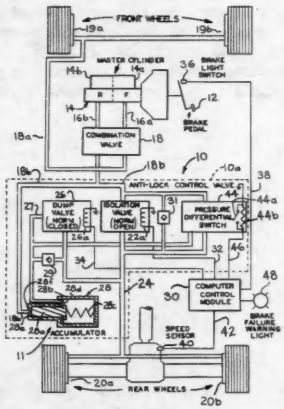
4,976,501
FLUID ACCUMULATOR FOR USE IN A VEHICLE ANTI-LOCK BRAKE SYSTEM

Gerald M. Sivulka, Ann Arbor, and Peter Every, Livonia, both of Mich., assignors to Kelsey-Hayes Company, Ann Arbor, Mich.

Continuation-in-part of Ser. No. 283,689, Dec. 13, 1988, Pat. No. 4,865,399, which is a continuation-in-part of Ser. No. 53,221, May 22, 1987, Pat. No. 4,828,335, which is a continuation-in-part of Ser. No. 764,162, Aug. 9, 1985, Pat. No. 4,668,023, which is a continuation-in-part of Ser. No. 702,765, Feb. 19, 1985, Pat. No. 4,673,226. This application Jul. 31, 1989, Ser. No. 387,470

Int. Cl.[5] B60T *8/32*

U.S. Cl. 303—113 **18 Claims**



1. In a vehicle anti-lock brake system adapted to control the fluid pressure in a brake circuit to at least one selected wheel brake to correct an impending lock-up condition of an associated wheel, the brake system including a valve means connected between the selected wheel brake and a fluid accumulator, the valve means being selectively controlled during anti-lock operation of the brake system to supply brake fluid to the fluid accumulator for reducing fluid pressure to the selected wheel brake, the fluid accumulator comprising:

a reservoir having an opening for receiving and retaining brake fluid during anti-lock operation;

means for maintaining fluid pressure of said brake fluid within said reservoir at a first predetermined pressure during anti-lock operation; and

means operative only when the brake system is not under anti-lock operation for applying a second predetermined pressure greater than said first predetermined pressure to said brake fluid within said reservoir to enable said brake fluid to flow through said opening and be returned to the brake circuit.

4,976,502
CABINET WITH POCKETING DOORS

James O. Kelley, Spring Lake; George A. Williams, Hudsonville; Andrew J. Kurrasch, Saugatuck, all of Mich., and Geoffrey A. Hollington, London, England, assignors to Herman Miller, Inc., Zeeland, Mich.

Filed Apr. 25, 1989, Ser. No. 342,957

Int. Cl.[5] A47B *88/00*

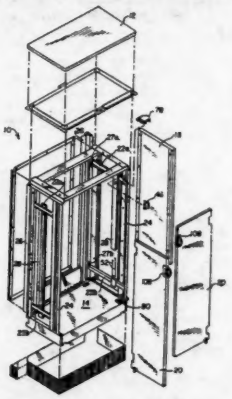
U.S. Cl. 312—322 **36 Claims**

1. In a cabinet comprising,

a pair of side walls, a top wall, a back wall, and a bottom wall connected together to provide a cabinet framework having an open front and an open interior;

a door having a first edge and a second edge opposite the first edge;

means for pivotally mounting the door to the cabinet framework for movement between a closed position wherein the door is adapted to at least partially cover the open front and to at least partially enclose the open interior, and a pocketed position wherein the door is received within the open interior of the framework and adjacent to one of



the side walls, the first edge of the door being first received within the framework during the movement of the door to the pocketed position;

characterized in that the door mounting means guides the door toward a partially pocketed position wherein the first edge of the door is guided into the framework interior as the door pivots from the closed position to the partially pocketed position.

4,976,503
OPTICAL ELEMENT FOR A VEHICLE WINDSHIELD

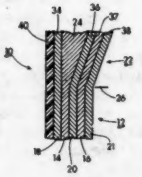
Floyd E. Woodard, Olivette, Mo., assignor to Monsanto Company, St. Louis, Mo.

Filed Jul. 27, 1989, Ser. No. 385,507

The portion of the term of this patent subsequent to Jul. 24, 2007, has been disclaimed.

Int. Cl.[5] C02B *5/28*

U.S. Cl. 350—1.7 **12 Claims**



9. An optical element for a motor vehicle windshield comprising, in combination:

(a) an interference filter interposed in the direct line of vision through a windshield when said optical element is disposed therein in a motor vehicle, comprising two or more light-reflecting metal layers, each surface of which is contiguous with a dielectric layer;

(b) an integral gradient band extension increasing in thickness toward a lateral edge of said element;

(c) a transparent substrate supporting said filter and extension; and

(d) plural conducting members parallel to said lateral edge in

electrically conductive contact with metal layers of the interference filter and gradient band extension;

whereby on supplying electrical power to said optical element, conductivity through the interference filter will be greater than through the gradient band extension.

4,976,504

HOLOGRAPHIC METHOD AND APPARATUS USING INCOHERENT LIGHT

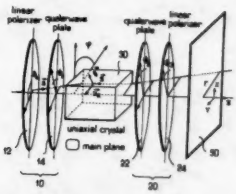
Gabriel Sirat; Eric Dufresne; Didier Charlot, all of Paris, and Alain Maruani, Saint Cyr L'Ecole, all of France, assignors to Etat Francais (Centre National d'Etudes des Telecommunications), Issy les Molineaux, France

Filed Dec. 22, 1989, Ser. No. 455,988

Claims priority, application France, Dec. 27, 1988, 88 17225

Int. Cl.[5] G03H *1/16*

U.S. Cl. 350—373 **16 Claims**



1. A method of generating a quasi-complex hologram using incoherent light and a conoscope system comprising a birefrigerant crystal inserted between two circular polarizers, the method comprising the following steps:

(i) recording a plurality of different conoscopic holograms of the same object without relative displacement thereof and with respective different polarization configurations;

(ii) digitizing said plurality of different conoscopic holograms to form a plurality of digital signals, each corresponding to one of said different conoscopic holograms, and

(iii) combining by calculation in an arithmetic processor the various digital signals corresponding to the different conoscopic holograms obtained in this way in order to remove the bias and the conjugate image.

4,976,505

OPTICAL SWITCH USING DIRECTIONALLY FLEXIBLE OPTICAL FIBRES

Stephen A. Cassidy, and Peter Yennadhiou, both of Ipswich, England, assignors to British Telecommunications public limited company, United Kingdom

PCT No. PCT/GB88/00261, § 371 Date Nov. 21, 1988, § 102(e) Date Nov. 21, 1988, PCT Pub. No. WO88/07696, PCT Pub. Date Oct. 6, 1988

PCT Filed Mar. 31, 1988, Ser. No. 279,159

Claims priority, application United Kingdom, Apr. 2, 1987, 8707852

Int. Cl.[5] G02B *6/26*

U.S. Cl. 350—96.15 **16 Claims**

15. An optical switch comprising:

at least one input optical waveguide and at least one output optical waveguide, at least one of said waveguides being movable with respect to another of said waveguides into and out of an optical coupling relationship;

said movable waveguide(s) having a non-circular cross section which produces a preferential path of motion into and out of said optical coupling relationship;

said movable waveguide being entirely electrically non-conducting, and further including electrostatic field generating means having a plurality of electrodes to provide a non-uniform electrostatic field, said preferential path of motion being directed toward a region of increasing electrostatic field density.

4,976,506

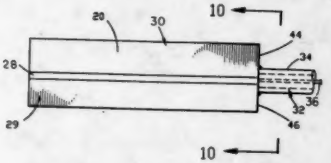
METHODS FOR RUGGED ATTACHMENT OF FIBERS TO INTEGRATED OPTICS CHIPS AND PRODUCT THEREOF

George A. Pavlath, 3513 Calle Quebracho, Thousand Oaks, Calif. 91360

Filed Feb. 13, 1989, Ser. No. 310,336

Int. Cl.[5] G02B *6/30*

U.S. Cl. 350—96.17 **12 Claims**



1. An optical device comprising:

an integrated optics chip having a substrate with at least one waveguide on a first surface thereof, a first plate with a first surface thereof attached to said first surface of said chip, and a second plate with a first surface thereof attached to a second surface of said chip opposite said first surface thereof, said first and second plates having end faces which extend substantially to each end face of said chip through which light coming from and leaving each said waveguide would exit and enter said chip; and

at least one optical fiber, each said fiber having an end face positioned adjacent said waveguide at one of said end faces of said chip so that said fiber can properly transmit light to and receive light from said waveguide, said fiber having a coaxial jacket on at least a portion thereof adjacent said fiber end face attached to said first and second plates at a plurality of symmetrical locations.

4,976,507

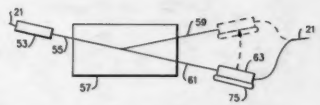
SAGNAC DISTRIBUTED SENSOR

Eric Udd, Huntington Beach, Calif., assignor to McDonnell Douglas Corporation, Long Beach, Calif.

Division of Ser. No. 208,982, Jun. 20, 1988, Pat. No. 4,898,468. This application Sep. 22, 1989, Ser. No. 410,856

Int. Cl.[5] G02B *6/32*

U.S. Cl. 350—96.18 **6 Claims**



2. A frequency shifter switch comprising:

transduction means for admitting light and acoustically shifting the frequency of said admitted light; and,

optical coupling means for receiving and transmitting both frequency shifted and non-frequency shifted light wherein said optical coupling means further comprises:

a first lens adjacent said transduction means, and generally linearly oriented to receive said non-frequency shifted admitted light;

a second lens adjacent said transduction means, and generally linearly oriented to receive said frequency shifted admitted light; and

an optic coupler having a first input optically connected to said first lens, a second input optically connected to said second lens, and at least one output for transmitting light from said first and said second lenses.

4,976,508

TAPE CORE TYPE COATED OPTICAL FIBER

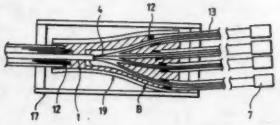
Toshihiko Okura; Kouji Hirao; Tetsuaki Watanabe, and Kouji Kashihara, all of Kanagawa, Japan, assignors to Sumitomo Electric Industries, Ltd., Osaka, Japan

Filed Aug. 15, 1989, Ser. No. 393,938

Claims priority, application Japan, Aug. 23, 1988, 63-208667

Int. Cl.[5] G02B *6/44*

U.S. Cl. 350—96.23 **19 Claims**



1. A tape core type coated optical fiber arrangement including a plurality of single optical fibers, comprising:

a housing;

a tape core type coated optical fiber member comprising a plurality of single optical fibers, the plurality of single fibers branching out from said tape core type coated optical fiber member inside said housing, said housing comprising a plurality of single fiber passages through which said single fibers pass such that each single fiber is encased by a single fiber passage only after branching out.

4,976,509

FLEXIBLE ELECTRICAL CONTROL CABLE

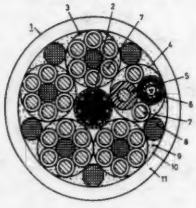
Andreas Bachmann, Sonnefeld, and Arad-Günther Carl, Neustadt B. CBG, both of Fed. Rep. of Germany, assignors to Siemens Aktiengesellschaft, Berlin & Munich, Fed. Rep. of Germany

Filed Dec. 18, 1989, Ser. No. 452,574

Claims priority, application Fed. Rep. of Germany, Aug. 16, 1989, 8909962[U]

Int. Cl.[5] G02B *6/44*

U.S. Cl. 350—96.23 **3 Claims**



1. A flexible electrical control cable comprising:

(a) central supporting member;

(b) a plurality of conductor bundles surrounding said central supporting member with interstices between said conductor bundles, at least one of said conductor bundles comprising four elements stranded together, said elements including an optical waveguide cable, a stranded element with a diameter equal to the diameter of said optical waveguide cable and two stranded elements with diameters smaller than the diameter of said optical waveguide cable; and

(c) braided lead cords arranged in the interstices between the conductor bundles.

4,976,510

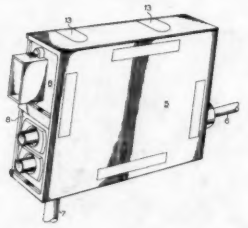
COMMUNICATION OUTLET

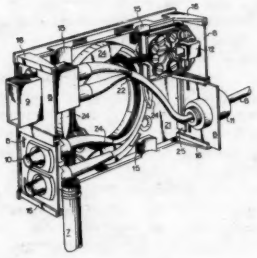
Dan I. Davila, Hickory; John A. Midkiff, Charlotte, both of N.C., and Dulip Ekanayake, Watauga, Tex., assignors to Siecor Corporation, Hickory, N.C.

Filed Nov. 20, 1989, Ser. No. 438,849

Int. Cl.[5] G02B *6/26*

U.S. Cl. 350—96.20 **5 Claims**





1. An outlet comprising:

(a) a backplate having first and second sides, the backplate having an opening therein for receiving a cable;

(b) a first set of sidewalls mounted to the first side of the backplate, the first set of sidewalls ringed about the opening and having a minimum inner radius equal to or greater than three centimeters;

(c) a second set of sidewalls mounted to the first side of the backplate ringed about the first set of sidewalls; and

(d) mounting means for mounting the backplate flush to an exterior surface.

4,976,512

NARROWBAND FIBEROPTIC SPECTRAL FILTER FORMED FROM FIBERS HAVING A REFRACTIVE INDEX WITH A W PROFILE AND A STEP PROFILE

Ahmad Safaai-Jazi, 6200 D. Terrace View, Blacksburg, Va. 24060

Filed Apr. 5, 1989, Ser. No. 333,572

Int. Cl.[5] G02B *6/22, 6/26, 6/02;* G01N *21/00*

U.S. Cl. 350—96.33 **7 Claims**

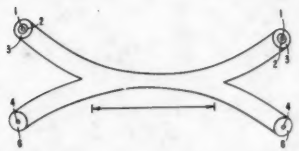
1. A fiberoptic spectral filter, comprising:

a first fiberoptic core;

a first inner cladding surrounding said first fiberoptic core;

a first outer cladding surrounding said first inner cladding;

a second fiberoptic core;
a second outer cladding surrounding said second fiberoptic core; and
an interaction region in which the first and second fiberoptic cores are brought within the evanescent field of light being transmitted in the other at a predetermined wavelength;



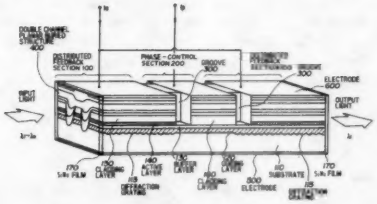
wherein the first fiberoptic core has a higher index of refraction than the first inner cladding;
the second fiberoptic has a higher index of refraction than the second outer cladding;
the first outer cladding has a higher index of refraction than the first inner cladding; and
the first outer cladding has the same index of refraction as the second outer cladding.

4,976,513

TUNABLE WAVELENGTH FILTER

Takahiro Numai, Tokyo, Japan, assignor to NEC Corporation, Tokyo, Japan

Filed Nov. 14, 1988, Ser. No. 270,921
Claims priority, application Japan, Nov. 11, 1987, 62-286136
Int. Cl.[5] G02B *5/18*
U.S. Cl. 350—162.11 **3 Claims**



1. A tunable wavelength filter, comprising:
a semiconductor substrate having a first electrode provided on a first surface thereof;
first and second distributed feedback sections provided on a second surface of said semiconductor substrate; and
a phase-control section provided on said second surface of said semiconductor substrate to be positioned between said first and second distributed feedback sections, each of said first and second distributed feedback sections and said phase-control section having a second electrode provided on respective surfaces thereof opposite to said semiconductor substrate;
wherein said phase-control section is optically coupled to said first and second distributed feedback sections, and a bandgap energy of said phase-control section is greater than that of said first and second distributed feedback sections.

4,976,514

LIQUID CRYSTAL DISPLAY DEVICE

Yasushi Murata, and Satoru Tanaka, both of Saitama, Japan, assignors to Pioneer Electronic Corporation, Tokyo, Japan

Filed Feb. 13, 1989, Ser. No. 309,129
Claims priority, application Japan, Aug. 3, 1988, 63-193734
Int. Cl.[5] G02F *1/13*; G02B *5/22*; F21V *7/04*
U.S. Cl. 350—345 **7 Claims**

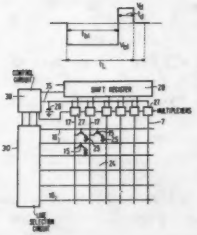
1. A liquid crystal display device comprising:
(a) a light responsive fluorescent screen that luminesces at least one kind of visible light when activated by a U.V. light impinging on said screen;
(b) an intercepting layer means disposed in front of the surface of said fluorescent screen for intercepting U.V. light discharging from said fluorescent screen so as to prevent said U.V. light form leaking outside of said display device; and
(c) a liquid crystal cell disposed in front of the surface of said intercepting layer means.

4,976,515

METHOD OF DRIVING A FERROELECTRIC TO DISPLAY DEVICE TO ACHIEVE GRAY SCALES

Wilbert J. A. M. Hartmann, Eindhoven, Netherlands, assignor to U.S. Philips Corporation, New York, N.Y.

Continuation-in-part of Ser. No. 160,424, Feb. 25, 1988, Pat. No. 4,840,462. This application Dec. 12, 1988, Ser. No. 283,416
Claims priority, application Netherlands, Dec. 21, 1987, 8703085
Int. Cl.[5] G02F *1/13*
U.S. Cl. 350—333 **16 Claims**



14. A display device comprising: a ferro-electro-optical display medium between two supporting plates; a system of picture elements arranged in rows and columns, each picture element being constituted by picture electrodes arranged on the facing surfaces of the supporting plates, and a system of row electrodes and column electrodes for driving the picture elements, the column electrodes connected to outputs of multiplex circuits which switch the column electrodes between the data signals to be displayed and an auxiliary signal so as to bring the liquid crystal element to an extreme state prior to application of the data signal; a control and synchronization circuit, which circuit, simultaneously with a selection voltage

on a row of picture elements to be displayed, first causes an auxiliary signal to appear on the column electrodes via the multiplex circuits, which signal has a sufficient duration and amplitude to bring a picture element to an extreme state, and which circuit subsequently causes data signals to appear on the column electrodes, characterized in that the auxiliary signal is presented to the picture elements via active switching elements during at least a first part of a line selection period and in that the picture elements are connected to the column electrodes via the same switching elements during a second part of the line selection period in order to present data signals to the picture elements, and further characterized in that the period during which the data signals are presented to the column electrodes is short with represent to the switching period of the ferro-electric liquid crystal.

4,976,516

DISPLAY DEVICE

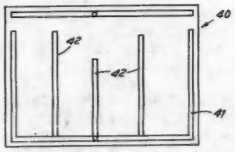
Andrew N. Carrington, Hemel Hempstead, England, assignor to Thorn EMI plc, London, England

Filed May 24, 1989, Ser. No. 356,297

Claims priority, application United Kingdom, May 24, 1988, 8812262

Int. Cl.[5] G02F *1/13*

U.S. Cl. 350—343 **15 Claims**



1. A cell for a liquid crystal display device, the cell comprising:

a first and a second substrate located in a substantially parallel relative arrangement to define an active display region therebetween which can be filled with liquid crystal material, said first and said second substrate being separated in the active display region by a gap having a gap thickness;

and a reservoir for filling the active display region with liquid crystal material, the reservoir being positioned intermediate and first and said second substrate and having an outlet port which extends along at least a part of an edge of the active display region wherein the reservoir has a width in the dimension corresponding to said gap which is greater than said gap thickness.

13. A method of filling a cell for a liquid crystal display device, the cell comprising:

a first and a second substrate located in a substantially parallel relative arrangement to define an active display region therebetween which can be filled with liquid crystal material, said first and said second substate being separated in the active display region by a gap having a gap thickness;

and a reservoir for filling the active display region with liquid crystal material, the reservoir being positioned intermediate said first and said second substrate and having an outlet port which extends along at least a part of an edge of the active display region, the reservoir having a width in the dimension corresponding to said gap which is greater than said gap thickness;

wherein the method includes the step of filling the reservoir with liquid crystal material whereby the cell is filled with liquid crystal material from at least a part of an edge of the active display region.

4,976,517

OPTICAL UNIT INCLUDING ELECTROOPTICAL CRYSTAL ELEMENTS

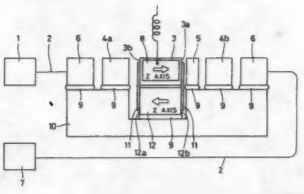
Yoshinari Kozuka, and Shogo Kawaguchi, both of Nagoya, Japan, assignors to NGK Insulators, Ltd., Japan

Filed Jan. 10, 1989, Ser. No. 295,356

Claims priority, application Japan, Jan. 14, 1988, 63-6297

Int. Cl.[5] G02F *1/01, 1/03;* G02B *5/30*

U.S. Cl. 350—355 **9 Claims**



1. An optical unit, comprising:

a first pyroelectric, electrooptical crystal element having first polarized faces;

a second pyroelectric, electrooptical crystal element having second polarized faces which each correspond to one of said first polarized faces, said second crystal element and said first crystal element being positioned such that a light beam is propagated through only one of said second crystal element and said first crystal element, wherein said second crystal element is formed of a substantially same material and has a substantially same surface area as said first crystal element; and

electrically connecting means for electrically connecting said first polarized faces and said second polarized faces such that a polarity of an electrical charge on each of said first polarized faces is opposite to that of a polarity of an electrical charge on a corresponding one of said second polarized faces;

wherein substantially equal amounts of positive and negative electrical charges are produced on the corresponding first and second polarized faces due to a variation in the ambient temperature of said first crystal element and said second crystal element, said electrically connecting means operating to discharge the positive and negative electrical charges on the corresponding first and second polarized faces.

4,976,518

FIBER OPTIC TRANSVERSAL FILTER/VARIABLE DELAY LINE

William K. Burns, Alexandria, Va., assignor to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed Sep. 13, 1989, Ser. No. 406,440

Int. Cl.[5] G02B *6/26, 6/42;* G02F *1/00, 2/00*

U.S. Cl. 350—96.16 **14 Claims**

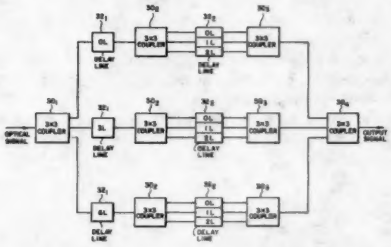
1. An optical transversal filter comprising:

input coupler means, comprising an optical power splitter, for receiving at least one optical input signal and providing a plurality of parallel outputs;

further coupler means comprising a like plurality of said optical power splitters each providing a further plurality of outputs;

intermediate fiber optic delay segments of at least two different lengths for coupling individual ones of said plurality of parallel outputs of said input coupler means to respective ones of said plurality of optical power splitters, and further fiber optic delay segments of at least two different

lengths individually connected to the respective outputs of said plurality of optical power splitters such that differ-



ent delays are provided at the outputs of said further fiber optic delay segments.

4,976,519

PROPELLABLE OPTICAL FIBER CABLE

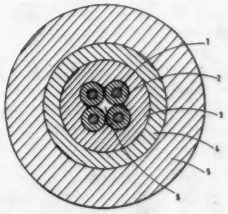
Rodney J. Davey, Rainhill, and Alan A. Sadler, Frodsham, both of England, assignors to BICC plc, London and Corning Limited, Sunderland, both of, England

Filed Jun. 22, 1988, Ser. No. 209,871

Claims priority, application United Kingdom, Jun. 23, 1987, 8714640

Int. Cl.[5] G02B *6/44*

U.S. Cl. 350—96.23 **8 Claims**



1. An optical fibre cable comprising an inner sheath containing at least one optical fibre member, and an outer sheath containing the inner sheath, the inner sheath comprising a material which has a shore hardness of not more than about 60A and has a modulus of elasticity of less than about 100 N/MM^2, and the outer sheath comprising a material such that the cable will traverse a 50 m length of duct having an internal diameter of 4.0 mm wound in a spiral around a cylindrical drum having a diameter of 0.75 m in not more than one hour when an air flow of 20 standard liters/minute is established down the duct.

4,976,520

COMMON PATH MULTICHANNEL OPTICAL PROCESSOR

Robert W. Brandstetter, Levittown, and Nils J. Fonneland, Lake Ronkonkoma, both of N.Y., assignors to Grumman Aerospace Corporation, Bethpage, N.Y.

Filed Sep. 9, 1988, Ser. No. 246,557

Int. Cl.[5] G02F *1/11*

U.S. Cl. 350—384 **8 Claims**

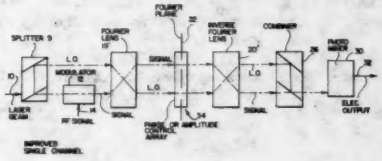
1. An optical processor having:

means for splitting light from a single laser source into a local oscillator (L.O.) beam and a signal beam parallel therewith;

means for modulating the parallel signal beam with an RF signal;

optical Fourier means positioned in optical alignment with the modulating means and located along the signal beam for spatially distributing the signal beam, the L.O. beam passing through the same Fourier means;

phase control means connected to the Fourier means for optically equalizing the phase of spatially distributed components of the signal beam;



means located downbeam of the Fourier means for combining the L.O. beam and signal beam maintained in close parallel relation through the processor thereby generating an optical signal corresponding to the signal beam after having undergone optical equalizing;

converting means responsive to the optical signal for generating a corresponding electrical output signal;

whereby parallel paths of the L.O. beam and signal beam cancel environmental effects that would otherwise adversely affect the phase equalization of the signal beam.

4,976,521

ZOOM LENS SYSTEM

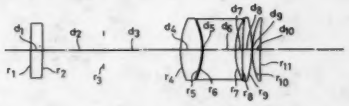
Atsujiro Ishii, and Tsutomu Uzawa, both of Tokyo, Japan, assignors to Olympus Optical Co., Ltd., Tokyo, Japan

Filed Aug. 18, 1989, Ser. No. 395,806

Claims priority, application Japan, Aug. 19, 1988, 63-204580

Int. Cl.[5] G02B *15/177*

U.S. Cl. 350—423 **8 Claims**



1. A zoom lens system comprising:

lens units including a first lens unit having negative refractive power and a second lens unit having positive refractive power disposed in order from the object side with an airspace therebetween, and so adapted as to change focal length thereof by varying at least the airspace reserved between said first lens unit and said second lens unit,

said first lens unit comprising at least one GRIN lens expressed by the formula shown below, and

said zoom lens system being so structured as to satisfy the following conditions (1) and (2):

$$n(r)=n_0+n_1r^2+n_2r^4+\ldots$$

$$n_1(d)>0 \quad (1)$$

$$0.9>f_t/f_a>-5 \quad (2)$$

wherein the reference symbol r represents distance as measured from the optical axis in the radical direction, the reference symbol n(r) designates refractive index of a lens portion located at a radial distance of r from the optical axis, the reference symbols n_0, n_1, n_2, ... denote the coefficients of 0-th, 2-nd, 4-th, ... order, the reference symbol

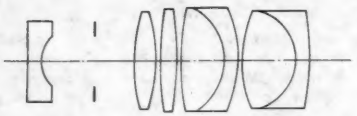
$n_1(d)$ represents value of the coefficient n_1 in refractive index distribution for the d-line, the reference symbol f_I designates focal length of said first lens unit, and the reference symbol f_α denotes focal length of a lens unit composed by replacing said GRIN lens with a lens element having the same shape thereof and made of a homogeneous medium having a refractive index of n_0 in the first lens unit.

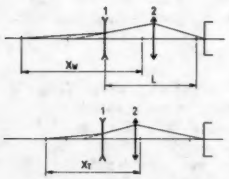
4,976,522

OBJECTIVE LENS SYSTEM FOR ENDOSCOPES

Tsutomu Igarashi, Tokyo, Japan, assignor to Olympus Optical Co., Ltd., Tokyo, Japan

Filed May 2, 1989, Ser. No. 346,598
Claims priority, application Japan, May 2, 1988, 63-107642
Int. Cl.[5] G02B *15/14, 13/18*
U.S. Cl. 350—426 **14 Claims**





1. An objective lens system for endoscopes comprising, in the order from the object side, a foremost first lens group having negative refractive power and a second lens group having positive refractive power, and so adapted as to perform variation of focal length and focusing at the same time by shifting said second lens group, with said first lens group kept fixed, along the optical axis in such a manner that magnification of said second lens group satisfies the following condition:

$$\beta_{2T}' < -1 < \beta_{2W}'$$

wherein the reference symbols β_{2T}' represents magnification of the second lens group in the longer focal length condition and the reference symbol β_{2W}' designates magnification of the second lens group in the shorter focal length condition.

4,976,523

METHOD OF ZOOMING IN A CAMERA AND DEVICE FOR USE IN SUCH METHOD

Yoshihiro Ishikawa, Tokyo, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan

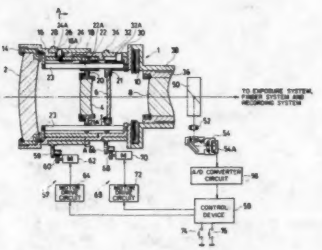
Filed Oct. 19, 1988, Ser. No. 259,637
Claims priority, application Japan, Oct. 20, 1987, 62-264227
Int. Cl.[5] G02B *15/00*
U.S. Cl. 350—429 **6 Claims**

3. A device for driving a zoom lens comprising a front lens group for collecting light, a magnification varying lens group for varying the magnification of an image of an object, a compensator lens group for correcting defocussing and a master lens group for allowing said object image to be formed on an image pickup plane, in which said magnification varying lens group and said compensator lens group are moved on an optic axis between said front lens group and master lens group to be able to adjust the focal distance and focussing position of a zoom lens system, said device comprising:

first drive means for moving said magnification varying lens group to an end of a tele photographing side or a wide photographing side;

switch means for sending said first drive means a drive signal to move said magnification varying lens group to said tele or wide photographing side;

second drive means for moving said compensator lens group to a position adjacent said magnification varying lens group;



automatic focussing means sending said second drive means a drive signal to correct de-focussing;

stopper means for determining an end of a moving range of said magnification varying lens group;

detecting means for detecting that said compensator lens group is moved up to said position adjacent said magnification varying lens group positioned at the end of said tele side; and,

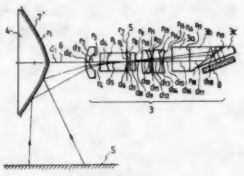
control means, responsive to a signal from said detecting means, for moving said magnification varying lens group and said compensator lens group to said wide side with an interval therebetween being maintained constant.

4,976,524

OPTICAL SYSTEM FOR ENDOSCOPES TO BE USED FOR OBSERVING THE INTERIOR OF PIPES

Masahiro Chiba, Hachiouji, Japan, assignor to Olympus Optical Co., Ltd., Tokyo, Japan

Filed Apr. 28, 1989, Ser. No. 344,606
Claims priority, application Japan, Apr. 28, 1988, 63-106906
Int. Cl.[5] G02B *13/18, 17/00*
U.S. Cl. 350—432 **8 Claims**



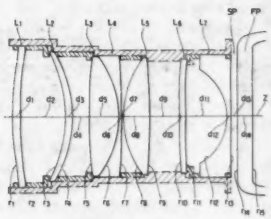
1. An optical system for endoscopes to be used for observing the interior of pipes comprising an imaging optical system and a reflecting mirror arranged in front of said imaging optical system, wherein at least one surface of lens components constituting said imaging optical system is an aspherical surface and at least one reflecting surface of said reflecting mirror is an aspherical surface including an optical axis of said imaging optical system and having a convex configuration toward said imaging optical system.

4,976,525

PROJECTION LENS SYSTEM FOR PROJECTORS

Takeshi Matsumura, and Noboru Koizumi, both of Omiya, Japan, assignors to Fuji Photo Optical Co., Ltd., Omiya, Japan

Filed Dec. 20, 1989, Ser. No. 453,841
Claims priority, application Japan, Mar. 30, 1989, 1-76781
Int. Cl.[5] B29D *11/00*
U.S. Cl. 350—432 3 Claims



1. A projection lens system, comprising from a screen side a positive first lens unit of weak power consisting of a plastic meniscus, a second lens unit of weak power consisting of a plastic lens element, third and fourth lens units in the form of a cemented glass lens having a positive combined focal length, a positive fifth lens unit of strong power, a positive sixth lens unit of weak power consisting of a plastic lens element, and a negative seventh lens unit having a concave surface on the screen side, each of said first, second, sixth and seventh lens units having at least an aspheric surface, and arranged to satisfy the following conditions

$$0.08 < f/f_1 < 0.18 \text{ and} \quad (1)$$

$$0.01 < |f/f_2| < 0.1 \quad (2)$$

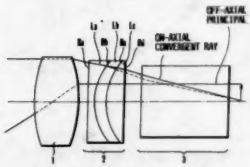
where f_1 and f_2 are focal lengths of said first and second lens units and f is the overall focal length of said projection lens system as a whole.

4,976,526

PERFORMANCE CORRECTING OPTICAL ASSEMBLY FOR PHOTOGRAPHIC LENS FOR TELEVISION

Shigeru Oshima, Kanagawa, and Kunio Takeshi, Tokyo, both of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Filed Mar. 28, 1989, Ser. No. 329,863
Claims priority, application Japan, Mar. 30, 1988, 63-77537; Mar. 30, 1988, 63-77538
Int. Cl.[5] G02B *9/64*
U.S. Cl. 350—463 15 Claims



1. An imaging performance correcting optical assembly arranged in between an image separation prism and a photographic lens, comprising:

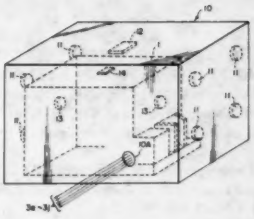
a plurality of lenses of which two adjacent lenses are made of different materials from each other, said plurality of lenses being cemented together such that each of the cemented surfaces is a concave surface facing the image side.

4,976,527

BEAM-COMBINING LASER BEAM SOURCE DEVICE

Kazuo Horikawa; Kouichi Okada, and Ichirou Miyagawa, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Aug. 24, 1989, Ser. No. 397,814
Claims priority, application Japan, Aug. 26, 1988, 63-212234
Int. Cl.[5] G02B *27/14*
U.S. Cl. 350—588 5 Claims



1. A beam-combining laser beam source device which comprises:

(i) an airtight housing, and

(ii) a laser beam source unit which is housed in said housing and which comprises:

(a) a plurality of laser beam sources,

(b) collimator optical systems respectively positioned in optical paths of laser beams, which are radiated from the laser beam sources in order to collimate the laser beams,

(c) optical path adjusting elements respectively positioned in the optical paths of the laser beams in order to radiate the laser beams along optical paths parallel and close to one another, and

(d) a support means which supports said laser beam sources, said collimator optical systems, and said optical path adjusting elements,

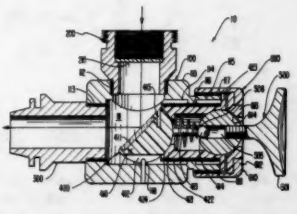
wherein said housing is provided with a temperature sensor, which detects the temperature in said housing, and temperature adjusting elements which heat or chill said housing on the basis of control of said temperature sensor so that the temperature in said housing is kept constant.

4,976,528

LASER MANIPULATOR

Joseph Cuda, 2937 Christopher Creek Rd. N., Jacksonville, Fla. 32217

Filed Feb. 17, 1989, Ser. No. 311,860
Int. Cl.[5] G02B *7/18*
U.S. Cl. 350—635 35 Claims



1. An apparatus for directionally controlling transmission of a laser beam or the like to a target area comprising:

a support body supporting a specular element suitable for reflecting a laser beam;

a receiving member having an exterior tubular shape including a mounting surface formed at one end of the tubular receiving member for receiving said support body; and

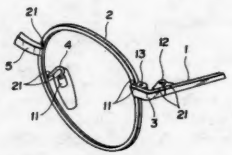
mounting means disposed within said tubular receiving member for releasably coupling said support body to said tubular receiving member and frictionally maintaining said support body seated against said mounting surface in a first position, while permitting friction restrained sliding movement of said support body on said mounting surface to other positions so that said specular element, once repositioned, may redirect the laser beam to other points on the target area.

4,976,529

SOLDERING MATERIAL FOR SPECTACLE FRAME AND SPECTACLE FRAME IN WHICH SAID SOLDERING MATERIAL IS USED

Kazuo Segoshi; Toshiyuki Okuda; Kenji Okamura, and Mizuo Yoshida, all of Fukui, Japan, assignors to Sigma Co., Ltd., Fukui, Japan

Filed Apr. 13, 1989, Ser. No. 337,255
Claims priority, application Japan, Apr. 28, 1988, 63-104316
Int. Cl.[5] G02C *5/14, 5/02*
U.S. Cl. 351—41 **7 Claims**



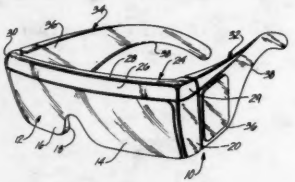
1. A soldering material for a spectacle frame, characterized by being formed of 5–15 wt.% of palladium, 5–15 wt.% of gallium, and a balance consisting of silver.

4,976,530

SUNGLASSES WITH VISOR

Frederick G. Mackay, Tarzana, Calif., and William J. Wichman, 702 Brownsage Dr., Glendora, Calif. 91740, assignors to William John Wichman, Glendora, Calif.

Continuation-in-part of Ser. No. 212,427, Jun. 28, 1988, abandoned. This application Mar. 17, 1989, Ser. No. 325,141
Int. Cl.[5] G02C *7/10*
U.S. Cl. 351—44 **25 Claims**



1. Sunglasses comprising:

an elongated unitary lens piece extending along a curved path and having an optical area to extend over a user's left and right eye fields of vision;

the lens piece being from a bendable plastic material which is transparent to light at least in the optical area thereof;

said lens piece being adapted for mounting in the user's field of vision by left and right temple pieces attached to the lens piece;

an elongated curved visor piece made from an opaque, bendable plastic material, the visor piece having means to snap lock it into a fixed position atop the lens piece;

a visor connector member integrally formed with and extending across the top of the lens piece from one upper corner to another upper corner of the lens piece;

the visor connector member comprising (a) an elongated curved upright front wall extending across the front of the lens piece with generally L-shaped ends at the upper corners of the lens piece, said upright front wall being recessed from the lens area to form an elongated ridge with L-shaped ends at the bottom front side of said upright wall; (b) a separate narrow slot formed in the bottom outer face of the L-shaped ends of the front wall above the ridge; and (c) a separate flat base surface extending away from a top surface of the ridge behind an upright rear edge at each end of the upright front wall, so that each slot extends in front of each base surface;

the visor piece comprising (1) an elongated curved front face with generally L-shaped ends matching the curvature and shape of the front wall of the visor connector section; (2) a narrow elongated curved top face extending along the top and projecting upwardly at an angle to said front face; (3) a separate hook at the bottom of each L-shaped end of the visor front face, each hook projecting inwardly in the same general direction as the top face of the visor piece; and (4) a separate shoulder projecting inwardly at the bottom of each L-shaped end of the visor piece front face, in front of each hook;

the visor piece being interlocked with said visor connector by engaging each shoulder of the visor piece in a corresponding slot on the visor connector front wall, with each hook of the visor resting on the base surface behind it, and engaged with each upright rear edge of the front wall of the visor connector,

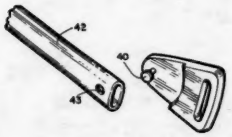
so that the front face of the visor piece overlies the front wall of the visor connector with the bottom of the visor piece resting on said ridge and with the face of the visor piece extending over and projecting inwardly from the top edge of the front wall on the lens piece, said upper face of the visor extending inwardly a sufficient distance to prevent light rays from entering the space between the top of the lens piece and the user's face.

4,976,531

EYEGLASSES RETAINER STRAP

Alan Kahaney, 2212 Place Monaco, Del Mar, Calif. 92014

Filed Nov. 27, 1989, Ser. No. 441,759
Int. Cl.[5] G02C *3/00*
U.S. Cl. 351—156 **4 Claims**



1. An eyeglasses retainer strap comprising:

an elongated member having a left end and a right end, said elongated member having a predetermined length and having a front surface and rear surface;

a pair of connecting members each having a front end, a rear end, and laterally spaced side surfaces;

an elongated slot adjacent the rear end of each of said connecting members for detachably receiving one of the ends of said elongated member;

means adjacent the front end of each of said connecting

members for detachably receiving one of the ear retainer portions of a temple member of a pair of eyeglasses;

said elongated member is formed from a flat strip of material that has each of its ends folded back upon itself to form a loop that passes through said elongated slot; and

snap fastener assembly means for detachably securing the respective ends of said elongated member to said elongated member after they have been folded back upon themselves.

4,976,532

HANGER FOR DISPLAYING EYEGLASSES

Michael S. Nyman, Ft. Lauderdale, Fla., assignor to Al-Site Corp., Miami, Fla.

Continuation-in-part of Ser. No. 145,222, Jan. 19, 1988, abandoned. This application Dec. 1, 1988, Ser. No. 278,546

Int. Cl.[5] G02C *1/00*; A47F *7/02*; A41D *27/22*

U.S. Cl. 351—158 **19 Claims**

8. A pair of eyeglasses and hanger means for removably mounting said eyeglasses on a horizontally extending cantilevered support;

said eyeglasses including first and second lenses positioned side by side with a nose gap open at one end disposed therebetween, a bridge extending across said gap at its other end, and temples operatively connected to said lenses at pivot points disposed remote from said nose gap;

said hanger means including a body having aperture means adapted to receive a horizontally extending cantilevered support, an extension projecting from a bottom edge portion of said body and bent to pass through said gap and form a loop that encircles said bridge, and fastening means in engagement with said extension to maintain said loop closed;

said loop being proportioned to cooperate with said eyeglasses for preventing separation of said hanger means from said eyeglasses without opening said loop, and for permitting a customer to try on said eyeglasses while said hanger means is mounted thereto;

with said temples folded, said eyeglasses constituting an elongated unit having its longitudinal axis positioned horizontally and below said body when said eyeglasses are mounted on a horizontally extending cantilevered support by said hanger means.

4,976,533

METHOD FOR MEASURING THE ROTATION OF AN ASSYMETRIC CONTACT LENS & LENSES FOR PRACTICING THE METHOD

Paul Hahn, Skokie; John Reynolds, Naperville, both of Ill.; Alan Tomlinson, Fullerton, Calif.; Robert J. O'Meara, and Martin Drazba, both of Arlington Heights, Ill., assignors to Schering Corporation, Kenilworth, N.J.

Filed Jun. 7, 1988, Ser. No. 203,381

Int. Cl.[5] G02C *7/04*; A61B *3/00*

U.S. Cl. 351—160 R **25 Claims**

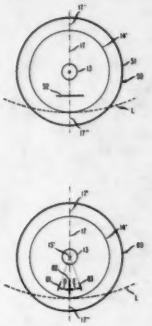
1. A contact lens comprising:

A. a corneal section intended to cover the cornea of the wearer;

B. a pupil section within said corneal section intended to cover the pupil of the wearer;

C. a vertical axis having a top intended to be located at the top of the wearer's eye and bottom intended to be located at the bottom of the wearer's eye;

D. a shape adapted to maintain said lens at its intended orientation within the eye;



E. a visible horizontal line segment located within said corneal section perpendicular to said vertical axis, said line segment and its extensions being outside of said pupil section; and

F. an assymetric prescription located over at least a portion of said corneal section.

4,976,534

SIMULTANEOUS VISION OPTICAL LENS FOR CORRECTING PRESBYOPIA

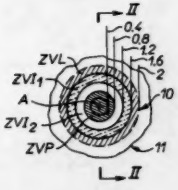
Christian Miege, Eaubonne; Pierre Monteil, Paris, and Gerard Obrecht, Les Moulineaux, all of France, assignors to Essilor International, Cie Generale D'Optique, Cretell Cedex, France

Filed Jan. 22, 1990, Ser. No. 468,282

Claims priority, application France, Feb. 3, 1989, 89 01417

Int. Cl.[5] G02C *7/04*; A61F *2/16*

U.S. Cl. 351—161 **5 Claims**



1. Progressive simultaneous vision optical lens for correcting presbyopia in which the curve representing its proximity P defined as the reciprocal in diopters of the distance D at which a light ray parallel to and at a distance h from its axis crosses the axis after passing through the lens lies within an area between a lower envelope curve P_{inf} and an upper envelope curve P_{sup} defined by nth and hth degree polynomials and satisfying the following equations:

$$P_{inf}=f(h)=(\Sigma A'_i h^i)+P_{VL}$$

$$P_{sup}=f(h)=(\Sigma A''_i h^i)+P_{VL} \quad (I)$$

in which P_{VL} is the proximity needed for far vision and A'_i, A''_i are the coefficients of the various polynomials depending

on the value of the proximity addition $\delta_1 = A_{DD}$ corresponding to the degree of presbyopia of the wearer, the values of these coefficients being substantially as follows:

for A_{DD} = 1.5 D:	
A'0 = 12.532267	A"0 = 16.9452
A'1 = −92.695892	A"1 = −106.8394
A'2 = 305.16919	A"2 = 302.62347
A'3 = −513.44922	A"3 = −443.97601
A'4 = 476.63852	A"4 = 362.53815
A'5 = −247.99097	A"5 = −166.29979
A'6 = 67.868942	A"6 = 40.015385
A'7 = −7.6131396	A"7 = −3.9203446
for A_{DD} = 2 D:	
A'0 = 23.56555	A"0 = 14.368889
A'1 = −182.77804	A"1 = −87.219223
A'2 = 605.05684	A"2 = 244.35987
A'3 = −1 024.1053	A"3 = −337.92626
A'4 = 962.99613	A"4 = 241.37509
A'5 = −511.24120	A"5 = −85.757212
A'6 = 143.7355	A"6 = 12.008102
A'7 = −16.663562	
for A_{DD} = 2.5 D:	
A'0 = −28.307575	A"0 = 2.874459
A'1 = 190.37743	A"1 = 11.541159
A'2 = −445.545294	A"2 = −35.715782
A'3 = 512.44763	A"3 = 37.849808
A'4 = −315.3125	A"4 = −19.0199096
A'5 = 99.678413	A"5 = 4.2867818
A'6 = −12.731333	A"6 = −0.28934118
for A_{DD} = 3 D:	
A'0 = 22.19555	A"0 = 57.071102
A'1 = −157.74065	A"1 = −357.09277
A'2 = 529.74104	A"2 = 1 000.8899
A'3 = −918.56382	A"3 = −1 509.5112
A'4 = 881.73279	A"4 = 1 311.576
A'5 = −475.73774	A"5 = −657.94254
A'6 = 135.48897	A"6 = 177.01095
A'7 = −15.888513	A"7 = −19.763759

and, for possible intermediate additions whose value δ is between two above-mentioned addition values δ_1 and $\delta_1+0.5$, the envelope curves of these intermediate additions are deduced from the envelope curves corresponding to δ_1 and $\delta_1+0.5$ by the equations:

$$P^{\delta}_{inf}(h) = \left(\frac{\delta - \delta 1}{0.5}\right)\Delta P_{inf} + P^{\delta 1}_{inf}$$

$$P^{\delta}_{sup}(h) = \left(\frac{\delta - \delta 1}{0.5}\right)\Delta P_{sup} + P^{\delta 1}_{sup}$$

with $\Delta P_{inf} = P^{\delta 1+0.5}_{inf} - P^{\delta 1}_{inf}$

$$\Delta P_{sup} = P^{\delta 1+0.5}_{sup} - P^{\delta 1}_{sup}$$

4,976,535
ENDOTHELVORSATZ

Werner Reis, Munich, Fed. Rep. of Germany, assignor to G. Rodenstock Instrumente GmbH, Ottobrunn-Riemerling, Fed. Rep. of Germany

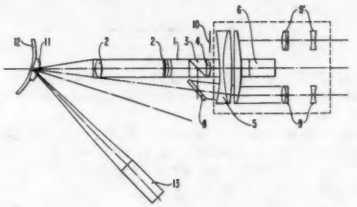
Filed May 2, 1989, Ser. No. 346,224

Claims priority, application Fed. Rep. of Germany, May 2, 1988, 3814866

Int. Cl.[5] A61B 3/10

U.S. Cl. 351—214 **11 Claims**

1. An endothelium attachment for a slit lamp device including microscope means having a primary objective and at least one ocular beam path for enabling observation of an eye to be examined, the endothelium attachment comprising means for detachable mounting on a housing of the slit lamp microscope means for increasing the magnification of the slit lamp microscope means, the magnification increasing means including a microscope objective positionable in front of the primary objective of the slit lamp microscope means between the eye to be examined and the primary objective, and beam splitter means provided between the microscope objective and the primary objective of the slit lamp microscope means, the beam splitter means being disposed along an optical axis of the primary objective of the slit lamp microscope means for deflecting a portion of light reflected by the eye to be examined into the at least one ocular beam path of the split lamp microscope means so that a portion of the light passing through the beam splitter means impinges upon at least one of a measuring and recording means.



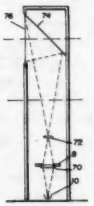
4,976,536
LIQUID CRYSTAL DISPLAY FOR PROJECTION SYSTEMS

James H. Vogeley, and Arthur W. Vogeley, both of Yorktown, Va., assignors to nView Corporation, Yorktown, Va.

Division of Ser. No. 44,332, Apr. 30, 1987, Pat. No. 4,763,993. This application May 16, 1988, Ser. No. 194,516

Int. Cl.[5] G03B 21/12

U.S. Cl. 353—77 **10 Claims**



1. A low stress work station for providing display images to an operator, said images based upon an electronic signal, said work station comprising:

means for projecting a beam of light along an optical path said projecting means including a light source;

a rear projection screen located at one end of said optical path and in a position to be viewed by said operator;

control means, responsive to said electronic signal, for generating liquid crystal means energizing signals;

twisted nematic crystal means, located along said optical path, for controlling polarization of light passing therethrough in response to localized energization and de-energization of said crystal means in accordance with said crystal means energizing signals;

means, responsive to said control means energizing signals, for selectively and locally energizing said crystal means, said selectively and locally energizing means comprising a first plurality of conductors, and a second plurality of conductors at least partially crossing said first plurality of conductors, such that when a single conductor from said first plurality and a single conductor from said second

plurality are energized, said crystal means is energized in the vicinity of the crossing of said single conductors;

back polarizing means, disposed in said beam and located between said crystal means and said light source, for polarizing light passing therethrough; and

front analyzing means, located between said crystal means and said rear projection screen, for allowing light of a selected polarization to pass therethrough and for blocking light not having said selected polarization.

4,976,537

DISTANCE MEASURING DEVICE WITH PLURAL DIFFERING REFERENCE VOLTAGES

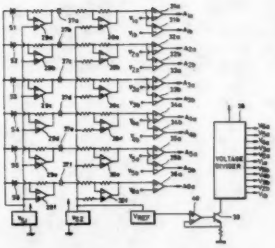
Takaaki Kotani, and Seiji Takada, both of Tokyo, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Oct. 12, 1988, Ser. No. 257,041

Claims priority, application Japan, Oct. 12, 1987, 62-256934; Oct. 12, 1987, 62-256935; Oct. 12, 1987, 62-256938

Int. Cl.[5] G01C *3/00*

U.S. Cl. 356—1 **19 Claims**



18. A distance measuring device, comprising:

a discharge tube for projecting flash light for distance measurement onto a subject;

at least one photosensor for receiving a part of flash light projected by said discharge tube and reflected from the subject and generating an output signal indicative of a subject distance;

storage means for storing said output signal and generating distance measuring data therefrom; and

control means for permitting said output signal to be sent to said storage means during a first preselected time period commencing at the end of a second preselected time period after a discharge trigger signal for causing said discharge tube to project flash light is applied to said discharge tube, and for preventing said output signal from being sent to said storage means after said first preselected time period has elapsed.

4,976,538

DETECTION AND DISPLAY DEVICE

DuWain K. Ake, Tipp City, Ohio, assignor to Spectra-Physics, Inc., San Jose, Calif.

Continuation-in-part of Ser. No. 228,465, Aug. 5, 1988, Pat. No. 4,907,874. This application Oct. 30, 1989, Ser. No. 428,624

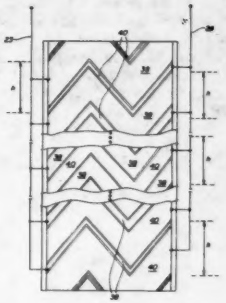
Int. Cl.[5] G01C *3/08;* H01J *40/14*

U.S. Cl. 356—4 **5 Claims**

1. A device for use with a transmitter which produces a beam of light having an energy distribution, the device capable of detecting and displaying the relative position of a generally horizontal reference plane of light, said device generating a linear response which is independent of beam size and energy distribution, comprising:

photodetector means, including first and second interdigitated photodetector elements positioned adjacent each other on said device, said first and second interdigitated photodetector elements providing first and second detection signals, respectively, said first and second interdigitated photodetector elements having a plurality of sections arranged in a generally vertically oriented row, wherein each section has at least one leg portion which is inclined with respect to said row,

circuit means, responsive to said photodetector means, for



determining the relative levels of said first and second detection signals such that the position of said reference plane of light with respect to said detector device is determined, and

display means, responsive to said circuit means, for providing an indication of said position of said reference plane of light with respect to said detector device.

4,976,539

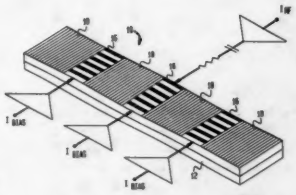
DIODE LASER ARRAY

Nils W. Carlson, Lawrenceville; Gary A. Evans, Robbinsville, and Charlie J. Kaiser, Trenton, all of N.J., assignors to David Sarnoff Research Center, Inc., Princeton, N.J.

Filed Aug. 29, 1989, Ser. No. 400,108

Int. Cl.[5] G01C *3/08;* H01S *3/00, 3/08;* G02F *1/00*

U.S. Cl. 356—5 **20 Claims**



1. A diode laser array comprising:

a substrate of a semiconductor material having first and second opposed surfaces;

a plurality of spaced gain sections on the first substrate surface, each of said gain sections having a cavity therein for generating light and which can provide both a high differential gain and potentially large depth of loss modulation;

a distributed Bragg reflector passive waveguide at each end of each gain section and optically coupling said gain sections, said waveguides having a grating period to provide an operating wavelength which is on the short wavelength side of the gain peak of the gain sections;

means for applying a DC bias to each of said gain sections; and

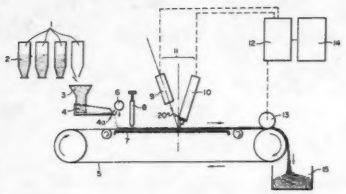
means for applying a modulation pulse to only one of the gain sections.

4,976,540

METHOD FOR DETECTING COLORED FOREIGN PARTICLES IN LIGHT-COLORED POWDER AND SYSTEM THEREFOR

Hajime Kitamura, Chiba; Masaru Takeuchi, and Hideo Yoshikoshi, both of Ibaraki, all of Japan, assignors to Shin-Etsu Chemical Co., Ltd., Tokyo, Japan

Filed May 25, 1989, Ser. No. 357,335
Claims priority, application Japan, May 27, 1988, 63-129857
Int. Cl.[5] G01N *21/28, 21/85, 21/89*
U.S. Cl. 356—38 **6 Claims**



1. A method for detecting colored foreign particles in a powder of a polyvinyl chloride resin which comprises the steps of:

(a) eliminating static electricity from the powder by spraying ethyl alcohol thereto;

(b) continuously feeding a running transfer means of powder with the powder to form a powder layer having a uniform thickness and a flat surface on the surface of the transfer means;

(c) continuously transferring the powder layer on the transfer means below a reflection-type laser-beam detector emitting a laser beam with scanning and receiving the laser beam reflected on the surface of the powder layer; and

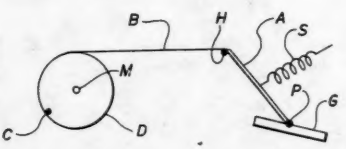
(d) counting the output signals coming out of the detector corresponding to the number of the colored foreign particles in the powder layer.

4,976,541

AUTOMATIC ATOMIC-ABSORPTION SPECTROMETRY METHOD

Theodore J. Scuitto, Grants Pass; Thomas J. Scuitto, Talent, and Al E. Bernhard, Brooking, all of Oreg., assignors to Analyte Corporation, Medford, Oreg.

Continuation of Ser. No. 14,873, Feb. 17, 1987, abandoned. This application Jan. 17, 1989, Ser. No. 298,779
Int. Cl.[5] G01J *3/42*
U.S. Cl. 356—300 **11 Claims**



1. A method for making atomic-absorption measurements for a plurality of samples, comprising the steps of:

selecting a particular sample; and

then analyzing the selected sample for a plurality of elements in turn, one at a time in a preestablished sequence, by making at least one atomic-absorption measurement corresponding to each element of the plurality, before making any atomic-absorption measurement for any other sample; and

then repeating the selecting and analyzing steps for a plurality of different particular samples;

wherein the analyzing step comprises, for one particular element of the plurality, the substeps of:

positioning the selected sample for measurement;

automatically selecting and moving into measurement position a particular lamp that emits a narrow spectral line of a particular wavelength used for analyzing the selected sample for the particular element;

automatically adjusting a monochromator to that particular wavelength of that spectral line; and

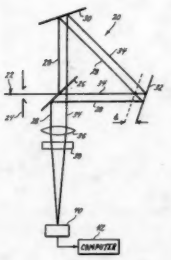
then automatically sensing the amount of light of that particular wavelength received from that particular lamp through the monochromator and through the selected sample, for use in determining the amount of the particular element in the selected sample.

4,976,542

DIGITAL ARRAY SCANNED INTERFEROMETER

William H. Smith, St. Louis, Mo., assignor to Washington University, St. Louis, Mo.

Filed Jul. 25, 1988, Ser. No. 223,927
Int. Cl.[5] G01B *9/02*; G01J *3/45*
U.S. Cl. 356—346 **15 Claims**



1. In an interferometer having means to process light from a light source to produce a fringe pattern of interfering light (interferogram) in a focal plane, the improvement comprising optic means to image the field of view onto a detector, the detector comprising a two-dimensional, semi-conductor array detector, said detector having means to detect the light intensity of said interferogram along both axes of said two-dimensional array.

4,976,543

METHOD AND APPARATUS FOR OPTICAL DISTANCE MEASUREMENT

Werner Scheck; Siegfried Idler, both of Kempten, Fed. Rep. of Germany, and Bernard Furrer, Winterthur, Switzerland, assignors to Baumer Electric AG, Frauenfeld, Switzerland

Filed Dec. 19, 1988, Ser. No. 286,049
Claims priority, application Fed. Rep. of Germany, Dec. 19, 1987, 3743194; Switzerland, Nov. 18, 1988, 4278/88
Int. Cl.[5] G01C *3/02*
U.S. Cl. 356—375 **31 Claims**

1. A method for optically measuring the distance between a measuring apparatus and an object comprising the steps of

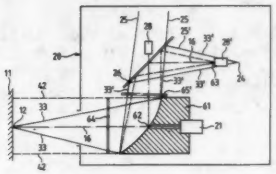
transmitting a highly collimated light beam from the measuring apparatus to a target area on the object,

one-dimensionally focussing light reflected from the target area into a light beam with an optical system in the measuring apparatus having a focal plane,

splitting the beam upstream of the focal plane into two partial beams with a beam splitter, and

measuring the radiation intensities of the two partial beams with two light detectors positioned in the common optical axis but at different distances from the beam splitter, and

producing electrical signals proportional to the measured intensities,



one of the intensity measurements being performed at one of the focal planes which is defined as the plane normal to the optical axis at the focus or in the focal line of the reflected-back beam,

the light detection taking place along one dimension and at least to the same extent as the light beam entering the measuring apparatus,

evaluating the electrical signals as a measure of the distance to be measured.

4,976,544

METHOD OF INSPECTING THE ENDS OF STACKED CIGARETTES

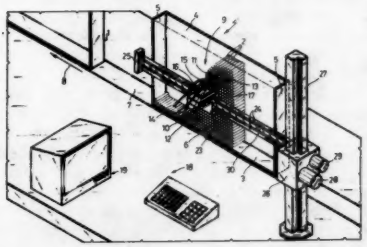
Armando Neri, Bologna, Italy, assignor to G.D Societa' Per Azioni, Bologna, Italy

Filed Jun. 26, 1989, Ser. No. 371,121

Claims priority, application Italy, Jun. 29, 1988, 3525 A/88

Int. Cl.[5] G01N *21/88*

U.S. Cl. 356—394 **10 Claims**



1. A method of inspecting the ends of a mass of stacked cigarettes (2) arranged one on top of the other with their ends aligned so as to form two opposite flat lateral surfaces of the mass formed by the same comprising:

locating electro-optical scanning means (13) facing a first (6) of said surfaces;

moving said electro-optical scanning means (13) in relation to said mass and over successive portions of said first surface (6) for scanning and producing images of the same;

comparing each said image with a reference image, for locating any faulty cigarettes (2) in said mass; and

removing each faulty cigarette from the mass of stacked cigarettes.

4,976,545

SENSOR DEVICE AND METHOD OF OPERATION

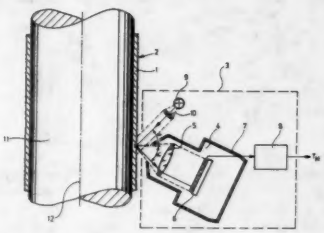
Helmut Kipphan, Schwetzingen, and Josef Haase, Neckargemund, both of Fed. Rep. of Germany, assignors to Heidelberger Druckmaschinen AG, Heidelberg, Fed. Rep. of Germany

Filed Sep. 30, 1988, Ser. No. 252,644

Claims priority, application Fed. Rep. of Germany, Sep. 30, 1987, 3732934

Int. Cl.[5] G01B *11/30*; G01N *21/84*; B41F *33/10*

U.S. Cl. 356—446 **12 Claims**



1. Sensor device for analyzing a surface structure comprising a lighting device for emitting a focussed beam of light rays directed onto a surface, a radiation detector element for sensing light rays reflected from the surface, and an evaluating device for determining the surface structure from signals emitted by said light-ray detector element, a parameter T_N for the surface structure being determinable by said evaluating device in accordance with a third moment of distribution of intensity of the reflected light rays in accordance with an equation:

$$T_N = K \sum_{i=1}^{n} (i - M)^3 P_i$$

wherein n represents a number of measuring points along a scattering indicatrix corresponding to the light rays reflected from the surface: P_i is an initialized measuring signal according to an equation:

$$P_i = \frac{I_i}{\sum_{i=1}^{n} I_i}$$

wherein I_i is the intensity of the light rays on a measuring point i; K represents a scaling factor; and M has a value determinable from values for i and P_i in accordance with the equation:

$$M = \sum_{i=1}^{n} iP_i.$$

4,976,546

TWO COMPONENT FLUID MIXING AND DISPENSING SYSTEM

Lewis J. Beattie, 3414 Willet Dr., Rochester Hills, Mich. 48309

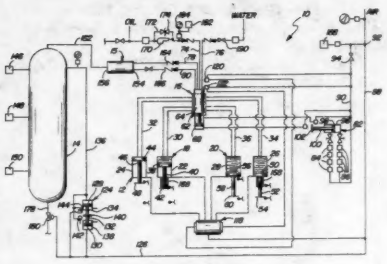
Filed May 12, 1989, Ser. No. 351,416

Int. Cl.[5] B01F *5/12, 15/04*; G05D *11/00*

U.S. Cl. 366—162 **50 Claims**

1. A fluid mixing apparatus (10) of the type for combining into a uniform mixture at least two liquid components, said apparatus (10) comprising: fluid pump means (12) for measuring a predetermined volume of a first liquid component and a predetermined volume of a second liquid component and for pumping the measured volumes of the first and second liquid

components; receptacle means (14) for receiving and containing the first and second liquid components pumped from said fluid pump means (12); mixer means (15) disposed between said receptacle means (14) and said fluid pump means (12) for uniformly mixing the first and second liquid components; and characterized by said fluid pump means (12) including continuous flow means (16) for continuously measuring and pumping the predetermined volumes of the first and second liquid components without loss of flow to said receptacle means (14).



4,976,547

CONTINUOUS TWO-LIQUID TYPE MIXER

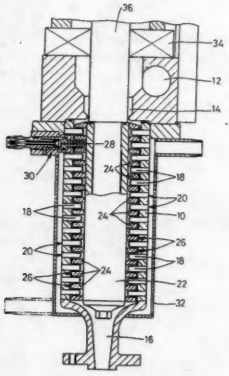
Akinori Hisanaga, Hyogo; Takashi Sakubata, and Tetsuo Yoshioka, both of Shiga, all of Japan, assignors to Kanegafuchi Kagaku Kogyo Kabushiki Kaisha, Osaka, Japan

Continuation of Ser. No. 322,609, Mar. 13, 1989, abandoned. This application Mar. 19, 1990, Ser. No. 499,212

Claims priority, application Japan, Mar. 14, 1988, 63-61197; Apr. 14, 1988, 63-92732

Int. Cl.[5] B01F *7/16*

U.S. Cl. 366—169 **6 Claims**



1. A continuous two-liquid type mixer comprising a cylindrical container having a liquid inlet at one end and an outlet at the other end;

rows of stationary stirring blades formed on the inside of said cylindrical container protruding substantially radially on the same periphery;

a rotor to rotate about the same axis and housed in said cylindrical container; and

rows of stationary stirring blades on the outside of said rotor protruding substantially radially on the same periphery in an alternate relation with said rows of stationary stirring blades on the inside of said cylindrical container, a flow channel defined by said cylindrical container with rows of stationary stirring blades and the rotor with rows of rotary stirring blades, a sectional area of the defined flow channel is made smaller or larger continuously or step wise from said liquid inlet side toward said liquid outlet side, and;

at least one liquid injection inlet is provided in either or both of said stirring blades on said liquid inlet side.

4,976,548

WATCH ADAPTABLE TO BEING WORN ON THE WRIST AND AROUND THE NECK

Pierre Tschanz, Neuwis 25, 8700 Küsnacht, Switzerland

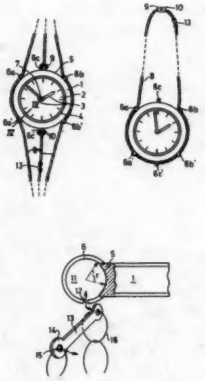
PCT No. PCT/CH83/00104, § 371 Date May 11, 1984, § 102(e) Date May 11, 1984, PCT Pub. No. WO84/01229, PCT Pub. Date Mar. 29, 1984

PCT Filed Sep. 12, 1983, Ser. No. 611,035

Claims priority, application Switzerland, Sep. 15, 1982, 5471/82

Int. Cl.[5] G04B *37/00*

U.S. Cl. 368—277 **3 Claims**



1. A watch adaptable to be worn on the wrist and around the neck, comprising:

a case housing a watch movement, a dial and hands;

a plurality of rings disposed symmetrically around the periphery of the case; and

a chain or selectively retained by the rings, said chain being retained by less than said plurality of rings to thereby be effectively lengthened for wear around the neck or being retained by said plurality of rings to thereby be effectively shortened for wear around the wrist, at least some of said rings being provided with a slot through which said chain may pass so as to be selectively retained by the rings, the chain including at least one link having a thickness less than the width of the slot so as to allow said at least one link to pass therethrough.

4,976,549

APPARATUS AND METHOD FOR DIRECT MEASUREMENT OF COAL ASH SINTERING AND FUSION PROPERTIES AT ELEVATED TEMPERATURES AND PRESSURES

M. Rashid Khan, Morgantown, W. Va., assignor to The United States of America as represented by the United States Department of Energy, Washington, D.C.

Filed May 12, 1989, Ser. No. 350,815

Int. Cl.[5] G01N *25/16*

U.S. Cl. 374—56 **2 Claims**

1. A microdilatometer for measuring thermophysical prop-

erties of ash of fossil fuel at elevated temperatures and pressures comprising:

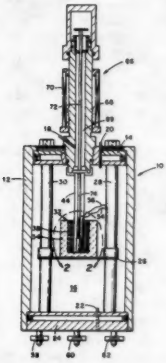
pressure vessel means having an enclosable volume therein;

heating means disposed in said volume and having a vertically oriented cavity therein;

sample holding means positionable in said cavity and adapted to contain a sample of ash of a fossil fuel;

first and second electrode means positionable in said sample holding means for respectively contacting vertically spaced apart first and second surface portions at opposite ends of said sample of ash when contained in said sample holding means;

circuit means coupled to said first and second electrode means for determining the resistivity of said sample of ash



when subjected to an elevated pressure and temperature with said circuit means having coupled therein variable resistor means connected in series with said sample ash through said first and second electrode means, a constant voltage supply means, and meter means for measuring the voltage drop across the variable resistor means with said voltage drop being indicative of changes in the resistivity in the sample of ash when the latter is subjected to said elevated temperature and pressure; and

transducer means adapted to contact a surface of said sample of ash when contained in said sample holding means for detecting volume changes in said sample of ash when subjected to said elevated pressure and elevated temperature provided by pressurizing said volume in the pressure vessel means and actuating said heating means.

4,976,550

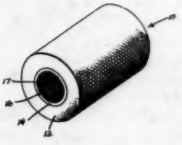
EXPANDED FIBER-REINFORCED BEARINGS

James P. Shobert, Walkerton, Ind., assignor to Plas/Steel Products, Inc., Walkerton, Ind.

Filed Aug. 3, 1987, Ser. No. 80,913

Int. Cl.[5] F16C *33/18, 33/20*

U.S. Cl. 384—298 **2 Claims**



1. A polymeric bearing comprising a plurality of strands of expanded polytetrafluoroethylene fibers having a breaking tenacity of more than 3 grams per denier and a continuous use temperature of about −350° F. to about +550° F., said strands having a fineness of about 400 denier, said strands being helically wound about a cylindrical surface to form a bearing tube having an inner bearing surface with a plurality of raised and depressed surfaces, the bearing tube including pores provided by interstices between and within said strands, and a resin selected from the group consisting of epoxy and polyester resins, said resin impregnating said depressed surfaces and said pores.

4,976,551

TRANSPORTATION AND MOUNTING SLEEVE FOR ROW OF ROLLING ELEMENT

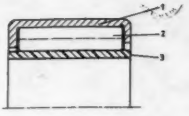
Günter Scharting, Gochsheim, and Wolfgang Ortmann, Euerdorf, both of Fed. Rep. of Germany, assignors to FAG Kugelfischer Georg Schafer (KGaA), Fed. Rep. of Germany

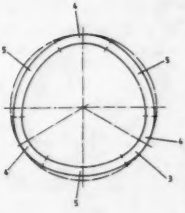
Filed Jan. 11, 1990, Ser. No. 463,507

Claims priority, application Fed. Rep. of Germany, Jan. 26, 1989, 8900848[U]

Int. Cl.[5] F16C *43/04, 19/22*

U.S. Cl. 384—448 **10 Claims**





1. A transportation and mounting sleeve for rolling elements for a bearing, wherein there is an outer ring for the rolling elements and the rolling elements are arrayed around and inside the outer ring,

the sleeve being comprised of resilient material, being continuous and unbroken around the sleeve and having a rounded polygonal shape including corners of the polygon, as seen in axial top view, disposed radially on the inside of the row of rolling elements in the outer ring, the sleeve being sized with respect to the outer ring and the row of rolling elements so that for installation of the sleeve inside the row of rolling elements, the corners of the polygon are pressed radially inward to fit the sleeve within the inner envelope circle of the row of rolling elements.

4,976,552

SEWING MACHINE OF A SEWING MACHINE BY WIRELESS CONTROLLER

Satoru Ishikawa, and Toshitaka Toyomi, both of Tokyo, Japan, assignors to Janome Sewing Machine Company Limited, Tokyo, Japan

Filed May 19, 1989, Ser. No. 354,149

Claims priority, application Japan, May 20, 1988, 63-121879

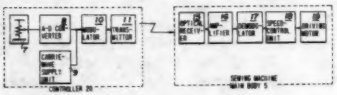
Int. Cl.[5] H02P *5/04*

U.S. Cl. 388—811 **11 Claims**

1. A sewing machine having a drive shaft rotatable to recip-

rocate a needle carrying an upper thread vertically, and to rotate in synchronism with said needle a loop taker having a lower thread located therein to form stitches, a drive motor rotatable in one direction to rotate the drive shaft, and a separate foot pedal controller operative by a variable resistor to produce an optional set voltage for operating a speed control circuit, said sewing machine also comprising:

means for converting said set voltage to a corresponding digital value and producing a series of data on the basis of said digital value;



means for producing carrier waves for carrying said series of data;

means for modulating said series of data by means of said carrier waves and producing modulated waves;

transmitter means responsive to said modulated waves to produce a corresponding light signal;

means for receiving said light signal; and

means for demodulating said received light signal for causing said speed control circuit to control the rotation speed of said drive motor.

4,976,553

VERY SMALL DISPLACEMENT ENLARGEMENT MECHANISM AND PRINTING HEAD USING THE SAME

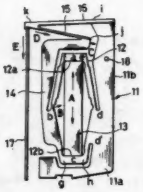
Morio Yamaguchi; Yasunori Kudoh, and Takashi Nakazato, all of Tokyo, Japan, assignors to Max Co., Ltd., Tokyo, Japan

Filed Dec. 8, 1988, Ser. No. 281,438

Claims priority, application Japan, Dec. 9, 1987, 62-311558; Dec. 9, 1987, 62-311359; Jun. 6, 1988, 63-138704; Jun. 8, 1988, 63-141361; Aug. 29, 1988, 63-214078; Aug. 31, 1988, 63-218107; Nov. 4, 1988, 63-278985

Int. Cl.[5] B41J *2/295;* H01L *41/04*

U.S. Cl. 400—124 **14 Claims**



1. A printing head comprising a printing unit having a plurality of very small displacement enlargement mechanisms, said very small displacement enlargement mechanisms comprising:

a piezoelectric element having a longitudinal axis for generating a dimensional strain along the longitudinal axis according to an applied voltage, to thereby effect a change in its length; and a deformable enlarging member including:

a pair of mounting sections;

a pair of links which are formed substantially straight from rigid material and disposed on opposite sides of the piezoelectric element with respect to the longitudinal axis thereof, each of said rigid links having two ends and being resiliently hinged at said two ends to said pair of mounting sections respectively and having an intermediate hinge portion at which said rigid links are resiliently bent according to said change in length of the piezoelectric element, each of said paired links having a link portion between the intermediate hinge portion of the corresponding link and one of said mounting sections, said link portions of both links being disposed opposite to each other with respect to the longitudinal axis of the piezoelectric element;

a pair of output sections provided on said respective link portions; and

said pair of mounting sections, rigid links and output sections being integrally formed so as to allow resilient deformation of the enlarging member;

said enlarging member engaging said piezoelectric element in a state that the enlarging member encircles the piezoelectric element in a closed loop and resiliently holds the respective ends of the piezoelectric element to be in compression by said pair of mounting sections, whereby said change in length of the piezoelectric element is transferred to the enlarging member which is placed in its deformation to output an amplified motion of the enlarging member through said output sections;

said enlarging member having four points corresponding to four apices of a parallelogram respectively, said pair of mounting sections being positioned at two points of said four points corresponding to two apices of said four apices respectively, which two apices are located diagonally opposite to each other, and said intermediate hinge portions of said links being positioned at other two points of said four points corresponding to other two apices of said four apices respectively, which other two apices are located diagonally opposite to each other, said printing head further comprising:

a printing-unit mounting member having a hollow cylindrical shape with a bottom and an inner peripheral surface, said mounting member further having a plurality of radially spaced-apart mounting grooves formed at least in said inner peripheral surface, and a cylindrical guide portion formed on the bottom along a central axis of the printing-unit mounting member;

said printing unit being mounted on said printingunit mounting member in a state that said first frame of the displacement enlargement mechanism is fitted in said corresponding mounting groove; and

said drive section of the displacement enlargement mechanism being a printing wire which is connected at its proximal end thereof to said output section and is guided at its extending portion thereof by said cylindrical guide portion in a state that said extending portion of the printing wire extends along said central axis of the printing-unit mounting member.

4,976,554

RELEASE-TYPE DOT PRINT HEAD AND METHOD OF MANUFACTURING THE SAME

Masashi Shimosato; Kuniaki Ochini, and Shinzi Tsuyuki, all of Shizuoka, Japan, assignors to Tokyo Electric Company, Ltd., Tokyo, Japan

Filed Oct. 14, 1988, Ser. No. 257,876

Claims priority, application Japan, Oct. 15, 1987, 62-260700; Feb. 12, 1988, 63-17955; Jul. 22. 1988, 63-183120

Int. Cl.[5] B41J *2/275, 2/24*

U.S. Cl. 400—124 **4 Claims**

1. A release-type dot print head comprising a magnet unit and an armature unit joined to the magnet unit,

said magnet unit comprising:

a first yoke having an open end,

a permanent magnet extended on the inner bottom surface of the first yoke, and

a plurality of cores mounted respectively with solenoids and arranged on the permanent magnet; and

said armature unit comprising:

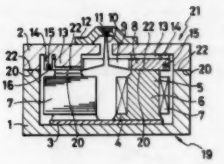
a second yoke having an end surface and supporting parts formed in the inner surface thereof,

a plurality of armatures each fixedly holding a stylus at the

free end thereof and arranged between the adjacent supporting parts of the second yoke so as to be positioned respectively opposite the cores of the magnet unit,

a stylus guide for guiding the styluses fixedly held on the armatures, attached to the second yoke,

torsion bars fitted in open grooves opening toward the cores, formed at least in either the armatures or the supporting parts of the second yoke and in receiving parts including grooves similar to those formed in either the armatures or the supporting parts in either the supporting parts or the armatures, and brazed respectively to the armatures and the supporting parts of the second



yoke with the armatures in a state in which the free ends of styluses are projected from the outer surface of the stylus guide by a predetermined length;

wherein the surface of the open end of the first yoke and the end surfaces of the cores are finished in flush polished surfaces, and the end surface of the second yoke and the surfaces of the armatures on the side of the cores are finished in flush polished surfaces with the armatures in a state in which the tips of the styluses are in alignment with the outer surface of the stylus guide, so as to be in close contact with the flush polished surfaces of the first yoke and the cores when the armature unit is joined to the magnet unit.

4,976,555

SERIAL PRINTER CONTROL CIRCUIT ENABLING LINE FEED DURING CARRIAGE DECELERATION

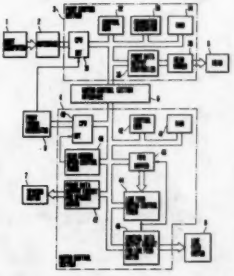
Shuziro Ueyama, Tokyo, Japan, assignor to NEC Corporation, Tokyo, Japan

Filed Nov. 9, 1988, Ser. No. 269,097

Claims priority, application Japan, Nov. 9, 1987, 62-281021

Int. Cl.[5] B41J *19/70*

U.S. Cl. 400—314.1 **1 Claim**



1. A serial printer control circuit for driving/controlling a spacing motor and a line feed motor by using a single CPU, comprising:

memory means for storing speed parameters for said head driving and line feed motors, which are supplied from said CPU;

a FIFO (First In First Out) buffer, controlled by said CPU, for receiving the speed parameters for said line feed motor from said memory means and storing the received parameters as timer data;

a timer for fetching the timer data until said FIFO buffer becomes empty, automatically starting an operation and counting in accordance with each timer data, and generating a trigger when counting based on the timer counter is ended; and

a control data output circuit for outputting control data representing a line feed direction of said line feed motor to said line feed motor in response to the trigger, wherein

said CPU performs control such that printing is performed in a period other than an acceleration/deceleration period of said spacing motor, and line feed is performed by starting said timer in a deceleration period of said spacing motor.

4,976,556

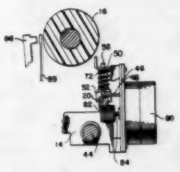
PRINT CARRIER RACK DRIVE

Scott J. Longrod, Lansing, N.Y., assignor to Smith Corona Corporation

Filed Jan. 9, 1989, Ser. No. 295,186

Int. Cl.[5] B41J *19/30*

U.S. Cl. 400—320 **5 Claims**



1. A print carriage moving mechanism on a printer frame comprising:

(a) a print carriage movably mounted on a guide rail means for longitudinal movement on said printer frame;

(b) a traveling motor fixedly mounted on said print carriage including a pinion attached to a rotary shaft of said motor;

(c) a rack having a line of teeth on one side and a flat surface on the opposite side thereof attached to said printer frame extending longitudinally substantially in parallel to said guide rail means;

(d) said rack being rigid longitudinally thereof and being flexible in a flex direction, perpendicular to its longitudinal direction, said rack's one side engaging said pinion, the one side of said rack including the line of teeth and the flat surface opposite said pinion being substantially parallel to said guide rail means; and

(e) spring loaded slider assembly means mounted as a part of said print carriage making continuous sliding contact with the flat surface of said rack opposite to said one side of the rack in the area of the pinion rotation.

4,976,557

SHEET CONVEYING DEVICE WITH AXIALLY DISENGAGED TRANSMITTER OF RESTRAINING FORCE

Yoshio Uchikata, Yokohama, Japan, assignor to Canon Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 170,687, Mar. 14, 1988, abandoned, which is a continuation of Ser. No. 829,485, Feb. 14, 1986. This application Jan. 29, 1990, Ser. No. 471,069

Claims priority, application Japan, Feb. 20, 1985, 60-030481

Int. Cl.[5] B41J *19/78*

U.S. Cl. 400—565 **6 Claims**

1. A sheet conveying apparatus for conveying a sheet, said apparatus comprising:

a first rotatable member for conveying a sheet;

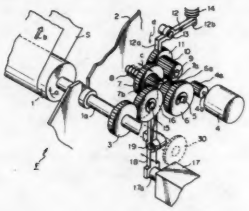
a driving source for driving said first rotatable member;

driving force transmitting means for transmitting a driving force of said driving source to said first rotatable member so as to rotate said first rotatable member by said driving force of said driving source, said driving force transmitting means having a second rotatable member rotatable around an axis different from a rotation axis of said first rotatable member;

a manual operating member for manually operating said first rotatable member;

detent means for producing a rotation restraining force of said first rotatable member;

restraining force transmitting means for transmitting a restraining force from said detent means to said driving force transmitting means, said restraining force transmitting means being rotatably supported on the same axis as said second rotatable member and having a third rotatable member shiftable between a first position for contacting and transmitting said restraining force to said second rotatable member and a second position being apart from and not for transmitting said restraining force to said second rotatable member; and



connecting-disconnecting means for normally holding said third rotatable member at said second position and moving said third rotatable member to said first position only when said first rotatable member is driven by said driving source.

4,976,558

DEVICE FOR FEEDING RECORDING MEDIUM IN THE LONGITUDINAL RECORDING DIRECTION

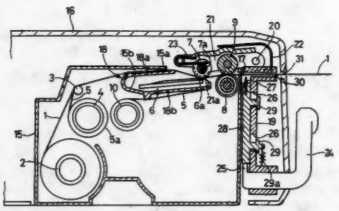
Susumu Kuzuya, Gifu; Seiji Shimizu; Mikio Kato, both of Nagoya; Yujiro Ishikawa, Toyota; Takashi Sakai, Nagoya, and Eiji Yuki, Owariasahi, all of Japan, assignors to Brother Kogyo Kabushiki Kaisha, Nagoya, Japan

Filed Nov. 14, 1988, Ser. No. 271,085

Claims priority, application Japan, Nov. 19, 1987, 62-292729; Mar. 15, 1988, 63-34269

Int. Cl.[5] B41J *11/36*

U.S. Cl. 400—615.2 **10 Claims**



1. A printing apparatus comprising:

a medium supply device for delivering a recording medium on which printing is effected;

a printing device for printing in at least one predetermined printing area on one of opposite surfaces of said recording medium; and

a first and a second feed roller holding said recording medium therebetween in rolling contact with the opposite surfaces of said medium, after said medium has passed said printing device, at least one of said first and second feed rollers being driven so as to rotate to feed said medium, said first feed roller contacting said one surface of said medium and having an outer circumferential surface which has at least one small-diameter portion whose outside diameter is smaller than that of the other portions, each of said at least one small-diameter portion being aligned with at least one of said at least one predetermined printing area in a direction perpendicular to a direction of feed of said medium, whereby said each small-diameter portion of said first feed roller is prevented from contacting said corresponding one of predetermined printing area of said one surface of the recording medium.

4,976,559

TYPEWRITER

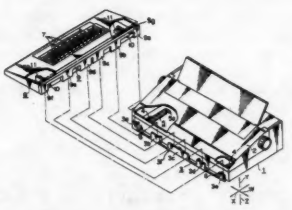
Yasuro Inagaki, Nagoya, Japan, assignor to Brother Kogyo Kabushiki Kaisha, Nagoya, Japan

Filed May 2, 1988, Ser. No. 189,149

Claims priority, application Japan, May 2, 1987, 62-67079[U]

Int. Cl.[5] B41J *29/02, 5/08*

U.S. Cl. 400—691 **10 Claims**



1. A typewriter comprising:

a keyboard unit having a plurality of operational keys and housed in a first housing;

a print mechanism unit operated in response to operation of said operational keys to print characters on a print medium and housed in a second housing;

first connect means for mechanically connecting said keyboard unit and said print mechanism unit so that said keyboard unit is supported by said print mechanism unit while being held in position against movement relative to said print mechanism unit at least in a downward pressing direction;

second connect means including at least one hole portion provided on a rear edge of said first housing and a rod member provided within said second housing and arranged to be extendable toward said first housing for engagement in said hole portion whereby to further connect said keyboard unit and said print mechanism unit;

said first connect means comprises first engaging means provided on either one of said first and second housings, and second engaging means provided on the other housing and engageable with said first engaging means; and

said first engaging means comprises a downward projecting wall secured at its top to a rear edge of said first housing, and said second engaging means comprises an upward projecting wall secured at its bottom to a front edge of said second housing and engageable in front of said downward projecting wall so as to prevent horizontal movement of said first housing away from said second housing.

4,976,560

MECHANICAL PENCIL WITH A PLASTIC CHUCK

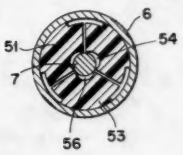
Katsuji Ohshita, Kure, Japan, assignor to The Sailor Pen Co., Ltd., Tokyo, Japan

Filed May 10, 1988, Ser. No. 192,129

Claims priority, application Japan, Nov. 26, 1987, 62-178930[U]

Int. Cl.[5] B43K 21/22

U.S. Cl. 401—65 1 Claim



1. A chuck and ring member for a mechanical pencil, comprising:

a chuck including a substantially cylindrical tube for introducing a lead therethrough, and a plurality of elastically deformable extensions integral with and axially extending from said cylindrical tube in peripherally spaced relationship with one another for holding said lead, each of said extensions having at a forward end portion thereof an engaging portion for grasping said lead by an inner surface thereof, and a connecting portion for connecting said engaging portion with said cylindrical tube, each of said engaging portions including a protrusion on a radially outward surface thereof;

a ring member arranged around said chuck so as to hold said chuck loosely in a first position and so as to hold said chuck tightly in a second position in which an inner surface of said ring member tightly conforms to the outer surfaces of said protrusions;

wherein a radius of curvature of said inner surface of each of said engaging portions is smaller than a radius of said lead, and each of said protrusions extends over a smaller circumferential arc than each of said engaging portions;

whereby a small clearance is formed between said lead and a peripherally central portion of each of said engaging portion inner surfaces when said lead and said engaging portions contact each other in said first position, and a portion of each of said engaging portion inner surfaces deforms outwardly when said ring member tightly conforms to the outer surfaces of said protrusions so that said engaging portion inner surfaces tightly conform to the outer surface of said lead in said second position.

4,976,561

WRITING TOOLS

Shuhei Kageyama, Kawagoeshi, Japan, assignor to Kotobuki & Co., Ltd., Kyoto, Japan

Continuation of Ser. No. 943,477, Dec. 17, 1986, abandoned. This application Dec. 16, 1988, Ser. No. 287,616

Claims priority, application Japan, Mar. 10, 1986, 61-153038[U]; Mar. 10, 1986, 61-109562[U]; Jul. 16, 1986, 60-204385[U]; Nov. 11, 1986, 61-182940[U]

Int. Cl.[5] B43K 21/08

U.S. Cl. 401—75 2 Claims

1. A writing tool comprising

an outer casing;

a core casing having writing means at one end; said core casing being insertable in said outer casing;

revolution-to-linear movement means between said outer casing and said core casing;

said revolution-to-linear movement means comprising;

inner sleeve means mounted on the end of said core casing opposite from said writing means end;

a rotatable sleeve fitting over said inner sleeve having a portion abutting said opposite end of said outer casing forming a rotatable operating means;

means between said rotatable sleeve and said inner sleeve means to convert rotational movement of said rotatable operating means to linear movement of said core casing; said cooperating means comprising;

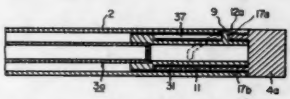
a boss on said inner sleeve on the end opposite said core casing end;

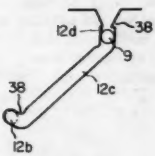
a first linear guiding slit in said rotatably sleeve;

a second guiding slit in said outer casing constructed to cooperate with said guiding slit;

said boss engaging said first and second guiding slits;

said second guiding slit having a linear entrance portion leading to a helical portion terminating in a circular start portion; said second guiding slit including a transitional circular slit portion at the end of said linear entrance portion and a convex restrictive portion at the end of said linear entrance portion, said convex restrictive portion being adjacent said transitional circular portion to provide a resistance to movement of said boss in said second guiding slit;





restrictive means at the entrance to the linear portion of said second guiding slit;

whereby rotational movement of said rotatable operating means in a first direction projects and holds said writing means extending beyond said outer casing, and rotational movement in the opposite direction retracts said writing end, and said rotatable sleeve can be withdrawn from said boss while said inner sleeve is retained.

4,976,562

DISPENSER

James R. Spivey, Irvine; William J. Dee, Chino, and William F. Brice, Lakewood, all of Calif., assignors to Spiveco, Inc., Anaheim, Calif.

Continuation of Ser. No. 274,920, Nov. 22, 1988, abandoned, which is a continuation-in-part of Ser. No. 198,390, May 24, 1988, Pat. No. 4,880,326. This application Jan. 8, 1990, Ser. No. 463,936

Int. Cl.[5] A45D 40/00, 40/06

U.S. Cl. 401—123 17 Claims

1. A dispenser comprising:

a cover member defining a compartment;

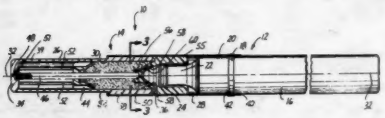
a flowable cosmetic in said compartment;

said cover member including first and second cover portions movable relative to each other;

an applicator member including an applicator tip for flowable cosmetic application purposes, said applicator member and the cover member being separable; and

an extrusion mechanism including means carried by said cover member defining an extrusion hole, said extrusion

mechanism being in said compartment and being responsive to relative movement between the first and second



cover portions for extruding flowable cosmetic from the compartment through the extrusion hole onto the applicator tip without passing through said applicator tip.

4,976,563

CONTAINER TYPE TOILET IMPLEMENT WITH AIR ESCAPE PASSAGE

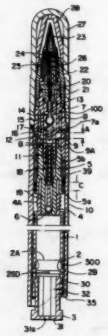
Shigeo Iizuka, and Tadao Saito, both of Tokyo, Japan, assignors to Yoshino Kogyosho Co., Ltd., Japan

Continuation-in-part of Ser. No. 147,629, Jan. 27, 1988, Pat. No. 4,808,022, which is a continuation of Ser. No. 854,768, Apr. 23, 1986, abandoned. This application May 3, 1988, Ser. No. 189,759

Claims priority, application Japan, Jul. 11, 1985, 60-106417; Nov. 15, 1985, 60-176232

Int. Cl.[5] B43K *29/00*

U.S. Cl. 401—176 **14 Claims**



1. A container type toilet implement for selectively dispersing lotion through a tip, comprising:

a container having lotion therein and defining upper and lower portions, the lower portion of the container including at least one groove on an inner surface of the container;

an operating mechanism connected to the upper portion of said container for selectively drawing lotion from said container to said tip;

a bottom cover elevationally movable toward said upper portion in response to lotion being drawn from said container to said tip by said operating mechanism, said bottom cover liquid-tightly sealing the lower portion of the container when positioned between the at least one groove and the operating mechanism;

said bottom cover including air escape means cooperating with said at least one groove for eliminating air trapped in said container between said lotion and said bottom cover as the bottom cover moves past said at least one groove.

4,976,564

IMPLEMENT FOR APPLYING LIQUID

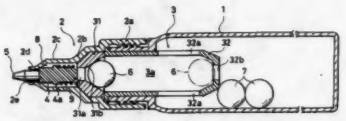
Mitsuhiro Fukuoka; Nobuaki Kobayashi, and Fumiyuki Tamiya, all of Osaka, Japan, assignors to Kabushiki Kaisha Sakura Kurepasu, Osaka, Japan

Filed Dec. 11, 1989, Ser. No. 449,274

Claims priority, application Japan, Dec. 16, 1988, 63-163720[U]

Int. Cl.[5] B43K *5/08*

U.S. Cl. 401—206 **21 Claims**



1. An implement for applying a liquid comprising:

an elongated container having a forward end which is open;

a front member attached to said forward end of said container, said front member having a longitudinal axis and an axially extending front tube having a forward end with an outlet opening;

an elongated accommodating member disposed within said container and extending into said front member, said accommodating member having an interior chamber having a rearward opening communicating with said container and a forward opening communicating with said front member;

a liquid feed member disposed in said interior chamber of said accommodating member, said accommodating member having a longitudinal axis, said feed member being axially movable in said interior chamber;

an end valve axially movable in said front tube between open and closed positions, a narrow retaining passage between said end valve and said front tube, said end valve in said open position allowing liquid to pass from said narrow retaining passage out through said outlet opening of said front tube, said end valve in said closed position closing off said outlet opening of said front tube, biasing means in said front tube for biasing said end valve toward said closed position;

said feed member being axially and reciprocably movable in said interior chamber upon manually shaking of the implement such that liquid in said interior chamber is forced into said narrow retaining passage via said front opening in said accommodating member; and

an applicator secured to said end valve and extending through said outlet opening of said front tube such that when said end valve is in said open position, the liquid in said retaining passage is drawn out by capillary action through said outlet opening to said applicator to be applied to a receiving surface.

4,976,565

DRAW BOLT APPARATUS FOR COUNTERTOP ASSEMBLAGE

Alexander Stefan, 216 E. Arby Ave., Las Vegas, Nev. 89119

Filed Jun. 11, 1990, Ser. No. 536,320

Int. Cl.[5] B25G *3/00*

U.S. Cl. 403—8 **6 Claims**

1. Apparatus for securing a first panel of countertop board to a second panel of said countertop board with an edge of first panel engaging an edge of said second panel, with a first shaped cavity in the underside of said first panel lying adjacent a shaped cavity in the underside of said second panel, each said shaped cavities having a large portion and a slot that extends from the large portion to the edge of each said panel, the slot of said first shaped cavity being aligned with the slot of said second panel, said apparatus comprising:

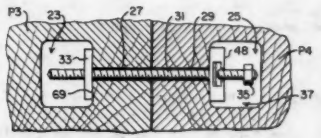
(a) threaded bolt adapted to be received in said aligned slots and to extend from one large cavity portion to an adjoining large cavity portion;

(b) pressure plate adapted to be threadedly received on one end portion of said bolt and for engaging a sidewall portion of said cavity;

(c) nut, threadedly received on the other end portion of said bolt;

(d) lock plate, having a central hole therethrough for receiving said bolt, the size of said hole being sufficient to pass said bolt when said plate is held normally to the axis of said bolt, and wherein edges of said hole make frictional engagement with the threads of said bolt when said lock plate is substantially tilted;

(e) pressure block adapted to be received on the other end of said bolt inwardly of said nut, and having a wall for abutting a sidewall of the large cavity portion in which said block is located, and the central portion of said block adapted to pass said bolt therethrough and to mount and



support said lock plate with one of its ends restrained and the opposite end unrestrained against inward movement, so that said lock plate is tiltable from a position normal to said bolt to a position substantially tilted thereto, and said central portion having an opening for exposing a first face of said lock plate;

(f) hand-operated tool means with a pair of handle-equipped pivoting levers that operatively connect to first and second shaped working ends of said tool so as to be urgable apart from each other when said handles are squeezed, said first shaped working end adapted to engage said nut and said second working end being shaped and adapted to be brought in engagement with said first face of said lock plate and the unrestrained end thereof; and

(g) whereby said tool is operable to urge said nut away from said block so that said pressure plate and said block engage respective ones of said cavity walls to draw said engaging panel edges tightly together and to substantially tilt said lock plate into binding frictional engagement with the threads of said bolt.

4,976,566

TOOL MOUNTING ASSEMBLY

Allan J. Yeomans, c/o Yeomans Plow Co., 70-82 Close Street, Parkes, P.O. Box 224, Parkes, N.S.W. 2870, Australia

Filed Aug. 30, 1989, Ser. No. 400,375
Int. Cl.[5] F16B *2/14*; A01B *15/00*
U.S. Cl. 403—374 **3 Claims**

1. An assembly for mounting an earth working tool to a shank having a forward end and a rear end, comprising:

a substantially vertical track on the rear end of the shank, said track being substantially arrowhead shaped in plan view with

a rearwardly facing portion including a substantially ninety degree angle, and

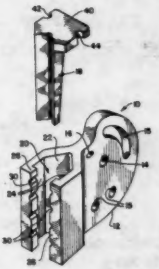
a pair of forward facing surfaces forward of the rearwardly facing portion, said forward facing surfaces including a first mating means;

a tool holder having a C-shaped opening at its forward end and adapted to fit over the track said opening having

a rear portion sloped from bottom to top and being defined by a pair of surfaces having an included angle of substantially ninety degrees,

inwardly extending flanges at each end of the C-shape opening, and

second mating means on the flanges adapted to engage said first mating means at a selected one of a plurality of heights; and



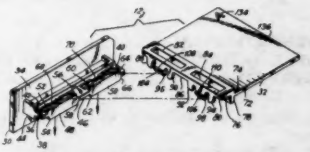
a V-shaped wedge member having an included angle of substantially ninety degrees, and said wedge member being adapted for wedging between the track and the tool holder to engage said first mating means with said second mating means to secure said holder to said shank at a selected position.

4,976,567

CONNECTOR FOR CORRUGATED MATERIALS

I. Martin Spier, 50 Park Ave., New York, N.Y. 10016

Filed Jun. 16, 1989, Ser. No. 367,238
Int. Cl.[5] F16D *1/00*
U.S. Cl. 403—407.1 **12 Claims**



1. A connector for corrugated materials comprising a first member, with said first member comprising a base portion and a projecting member having at least one aperture and a second member with said second member having a base portion and projecting finger means projecting from said base member and proportioned to removeably project into said aperture of said first member thereby locking said first and said second members together, in which said projecting finger means comprises at least one cantilever flexible finger means and at least one cantilever rigid finger means lying in the same plane and with the flexible finger means pivotable transversely out of said plane.

4,976,568

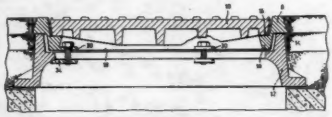
DEVICE FOR RAISING LEVEL OF MANHOLE COVER

Mathias C. Hess, Brights Grove, Canada, assignor to The Hopper Foundry (1977) Limited, Ontario, Canada

Continuation of Ser. No. 260,299, Oct. 20, 1988, abandoned. This application Apr. 2, 1990, Ser. No. 503,093

Int. Cl.[5] E02D *29/14*

U.S. Cl. 404—26 **1 Claim**



1. A manhole assembly comprising:

(a) a manhole cover frame having, a manhole opening extending therethrough and a support flange extending around the perimeter of the manhole opening, a first manhole cover seat extending downwardly to the support flange, said seat being downwardly tapered and an upper face extending laterally outwardly from the seat,

(b) a spacer ring having an upper portion and a lower portion, the lower portion having an external recess formed below the upper portion such that a lower face of the upper portion forms a first seating surface that rests on the upper face of the manhole cover frame, the lower portion tapering downwardly from said upper portion and being fitted in a free fitting relationship within said first manhole cover seat, and an internal recess extending downwardly within the upper portion and forming a second seat which is downwardly tapered and which has a manhole cover support face that extends laterally inwardly and is located below said first seating surface,

(c) clamping means carried by the spacer ring and clamping the spacer ring to the support flange of the manhole cover,

(d) a manhole cover having an outer side face that is downwardly tapered and a supporting edge of a predetermined thickness extending inwardly from said outer side face and having a lower face that extends inwardly from said outer side face, the manhole cover being fitting in a free fitting relationship within said second seat with said lower face resting on the manhole cover support face of the spacer ring such that the extent to which the manhole cover is raised above the first manhole cover seat is less than the predetermined thickness of the supporting edge of the manhole cover.

4,976,569

METHOD OF INTRODUCING ECOLOGICALLY HARMFUL WASTE INTO SUBTERRANEAN CAVITIES

Georg Braehler, Freigericht; Benno Ganser, Alzenau-Wasserlos, and Paul-Gerhard Maurer, Neuberg, all of Fed. Rep. of Germany, assignors to NUKEM GmbH, Hanau, Fed. Rep. of Germany

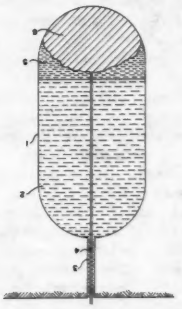
Filed May 18, 1988, Ser. No. 195,595

Claims priority, application Fed. Rep. of Germany, May 20, 1987, 3716851

Int. Cl.[5] B09B *1/00*

U.S. Cl. 405—59 **7 Claims**

1. A method of storing ecologically harmful waste in a subterranean cavity having an opening to the surface and being filled with water or brine, comprising selecting a liquid which is not miscible with and is specifically heavier than water or brine, introducing said liquid into said cavity below the water or brine, to thereby form a layer of said liquid below a layer of water or brine, inserting conduit means into said opening and lowering said conduit means until the lower end of said conduit means is into the layer of said liquid and then introducing said waste into said liquid which is not miscible with water or brine, wherein the density of the waste is higher than that of



the said liquid and removing the water or brine displaced by the waste introduced from said opening.

4,976,570

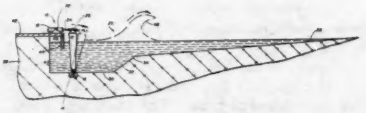
APPARATUS AND METHOD FOR GENERATING WAVES IN A BODY OF WATER

Walter R. Davis, Lebanon, and Todd H. Nahrup, Loveland, both of Ohio, assignors to Water Parks, Inc., Mason, Ohio

Filed May 15, 1986, Ser. No. 863,291

Int. Cl.[5] F04H *3/16*; F04D *35/00*

U.S. Cl. 405—79 **6 Claims**



1. A device for creating waves of water comprising:

a wave-generating member reciprocable from a first forward position to a second return position;

means for cyclically reciprocating said wave-generating member in water to create waves; and

means positioned adjacent said second return position of said wave-generating member for dissipating wave energy from water generated by movement of said wave-generating member from said first position to said second position comprising a baffle forming a chamber containing air, said baffle trapping the water moved by the returning of said wave-generating member to said second position such that the force of said water compresses said air in said chamber to dissipate the wave energy generated.

4,976,571

ANCHOR DEVICE FOR SECURING ROCK BOLTS

Dennis Z. Mraz, and Anil Mahyera, both of Saskatoon, Canada, assignors to Engineered Instruments, Inc., Saskatoon, Canada

Filed Apr. 6, 1990, Ser. No. 505,367

Int. Cl.[5] E21D *20/02*

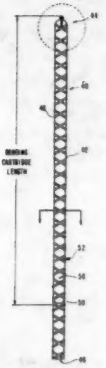
U.S. Cl. 405—261 **12 Claims**

1. An anchor device for securing a rock bolt in a borehole of predetermined diameter, the device comprising:

an elongated plastic cartridge having a first insertable end and a second end, a side wall extending between the ends, and stiffening means integrally formed in the side wall for stiffening the cartridge to permit insertion thereof into the borehole;

a top wall provided near the first, insertable end of the cage; and

a bottom wall disposed between the first and second ends of the cartridge, a compartment for receiving a bonding agent being formed between the top and bottom walls, said bottom wall being spaced axially from the second end of the cartridge to form an extended portion of the cartridge which receives the anchor bolt to be secured in the borehole, said compartment being frangible to release the bonding agent upon insertion of the rock bolt into the compartment through the extended portion of the cartridge.



4,976,572

METHOD AND AUTOMATIC MACHINE FOR MACHINING COILED STOCK

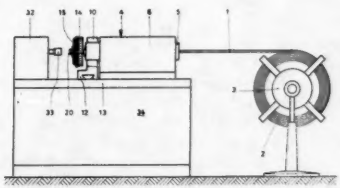
Harold Habegger, Sous-Graitery 10, CH-2738 Court, Switzerland

Filed Apr. 13, 1989, Ser. No. 339,561

Claims priority, application Switzerland, Apr. 15, 1988, 1401/88

Int. Cl.[5] B23C *3/04*

U.S. Cl. 409—132 **3 Claims**



1. A method of machining workpieces out of a thread-like stock which has been wound up into a coil from one end to provide a free end portion at the other end, said method comprising the steps of:

unwinding from said coil said free end portion and an adjacent length of said coiled stock corresponding to a distance at which a machine for machining said workpieces is located apart from said coil and any device associated therewith for straightening said coiled stock;

introducing said free end portion of said coil into said machine, said machine having at least one rotating and shaped milling cutter or grinding wheel;

moving said milling cutter or grinding wheel in a direction substantially perpendicular to the axis of said free end portion so that said milling cutter or grinding wheel engages said free end portion; and,

causing said free end portion to turn about its axis between two limits set apart through an angle of at least 360° while said milling cutter or grinding wheel is engaged with said free end portion and said free end portion is integral with said coiled stock; said adjacent length of unwound stock being sufficient to prevent said turning from damaging said stock.

4,976,573

APPARATUS FOR CHAMFERING PLANAR PLATE

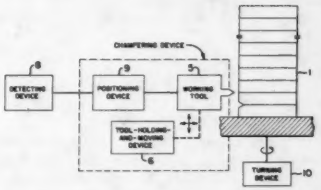
Kamehru Seki, and Isamu Kubo, both of Saitama, Japan, assignors to Nippon CMK, Corp., Japan

Filed Jan. 3, 1989, Ser. No. 292,895

Claims priority, application Japan, Mar. 23, 1988, 63-68677

Int. Cl.[5] B23C *3/12*

U.S. Cl. 409—138 **15 Claims**



1. An apparatus for chamfering the edges of stacked plates, comprising: detecting means comprising a CCD camera for detecting the boundary between two adjacent stacked plates in a stack of plates; and chamfering means positionable adjacent to opposed outer edges of respective ones of the two adjacent stacket plates in response to detection of the boundary and relatively movable along the opposed outer edges for simultaneously chambering both opposed edges.

4,976,574

DEVICE FOR CONNECTING TWO TOOL PARTS

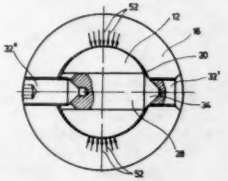
Werner Muendlein, Bietigheim-Bissingen; Gerhard Scheer, Loechgau, and Gerhard Stolz, Ingersheim, all of Fed. Rep. of Germany, assignors to KOMET Stahlhalter- und Werkzeugfabrik Robert Breuning GmbH, Besigheim, Fed. Rep. of Germany

Filed Mar. 23, 1990, Ser. No. 498,036

Claims priority, application Fed. Rep. of Germany, Sep. 8, 1989, 3929976

Int. Cl.[5] B23B *29/26*

U.S. Cl. 409—232 **1 Claim**



1. In a device for connecting two tool parts having a common axis, in particular an axis of rotation, comprising a fitting pin axially projecting from the first tool part, comprising an annular end face surrounding the fitting pin at its root, comprising a connecting sleeve axially projecting from the second tool part and which has a mating bore to receive the fitting pin and a ringlike end face which can be pressed against the annular end face, comprising a one-part or multi-part tightening bolt movable in a crossbore of the fitting pin and, if desired,

arranged rotatably about its axis, having an internal or external cone or a sloped cam surface at its ends, and comprising two retaining screws guided in diametrically opposed internally threaded openings in the connecting sleeve, having an external or internal cone or a sloped cam extending toward the inside of the sleeve and corresponding with the internal or external cone or the sloped cam surface of the tightening bolt, which cone or cam surfaces are wedged, during the tightening operation with the tightening bolt, the tightening bolt and the retaining screws being offset or misaligned so as to cause during the tightening operation the pulling of the fitting pin into the mating bore and the mutual pressing of the annular end face and of the ringlike end face together, the improvement wherein the connecting sleeve has a wall thickness selected to be widened elastically in axial direction of the tightening bolt during the tightening operation and the internal tolerances of the mating bore and fitting pin are selected so that the sleeve is pressed in transverse direction to the axial direction of the tightening bolt with an elastic diameter reduction in diametrically opposed areas, with the inner surface of the mating bore against the surface of the fitting pin.

4,976,575

TOOL HOLDING SYSTEM FOR AUTOMATIC TOOL CHANGING

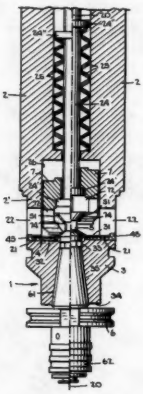
Heinrich Kappelhof, and Gottfried Wolf, both of Schöppingen, Fed. Rep. of Germany, assignors to AXA-Entwicklungs- und Maschinenbau- gesellschaft für produktionstechnische anlagen und Geräte mbH, Schoeppingen, Fed. Rep. of Germany

Filed Apr. 12, 1988, Ser. No. 180,468

Claims priority, application Fed. Rep. of Germany, Apr. 15, 1987, 3712820

Int. Cl.[5] B23C *1/00*

U.S. Cl. 409—233 **8 Claims**



1. Tool holding system for automatic tool changing comprising: a spindle which has a longitudinal axis and which has a free end and which has in its free end sleeve means for gripping a tool holder which can be inserted and removed by a tool holder changing system, a draw rod coupled to the sleeve means and actuating the sleeve means by axial displacement, the sleeve means having a conical inside surface, a tool holder having a spindle end, a tool holding head having a spindle end and a tool end with said tool end of said tool head having a means receiving and securing said spindle end of said tool holder and said spindle end of said tool head having an inverted centering frustum cone which, to clamp the tool head against the spindle, is held by the sleeve means in a gripping position with the conical inside surface of the sleeve means, the sleeve means having a T-shaped slot open at at least one end, the spindle free end having at least one side having a through slot sized for lateral passage of said frustum cone, means for transferring torque from said spindle to said tool head, and the slots of the sleeve means and the end of the spindle being positioned in alignment with one another permitting the insertion and removal of said frustum cone of the tool holding head into and from said at least one side of said spindle end.

4,976,576

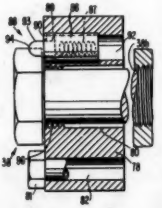
CAPTIVE SELF-LOCKING MECHANISM

Bernard F. Mahaney, Jr., Kent, Wash.; Carl W. Beck, Peck, Kans.; Kim B. Nixon, Towanda, Kans.; Randolph Connolly, Wichita, Kans., and Terry V. Nunemaker, Rose Hill, Kans., assignors to The Boeing Company, Seattle, Wash.

Filed Feb. 24, 1988, Ser. No. 159,608

Int. Cl.[5] F16B *39/10*

U.S. Cl. 411—121 **17 Claims**



1. A device for releasably retaining a bolt in engaging relationship with first and second members having coaxial bores, said bolt having a multifaceted head and a threaded portion at opposite ends of a shank, the head of said bolt located on a side of first member opposite said second member and disposed for engagement by a tool, the threaded portion of said bolt threadably engaging threads in the bore of said second member, said device comprising:

plate means having a bore therethrough for receiving said bolt, said bore having an internally threaded portion for threadably engaging the threaded portion of said bolt to prevent an unintentional removal of the bolt from the bore of the plate means;

means for rigidly securing said plate means to said first member with said bore of said plate means in coaxial relation with the bores in said first and second members;

retaining means movably mounted on said plate means, said retaining means being movable between a first position in engagement with a selected number of the facets that is less than the total number of facets of the plate for securing said bolt against rotation relative to said plate means and a second position out of engagement with the facets for permitting said relative rotation, said retaining means having a surface portion positioned to engage said tool at times when said tool is placed on said bolt head for moving said retaining means to the second position and at times when said tool is rotated to effect said relative rotation of said bolt; and

means for biasing said retaining means to the first position.

4,976,577

LOCKING BOLT ASSEMBLY

Steve K. Brown, Lynchburg; Larry D. Dixon, Forest, and Joseph F. Sharrow, King George, all of Va., assignors to The Babcock & Wilcox Company, New Orleans, La.

Filed Jun. 25, 1990, Ser. No. 542,500

Int. Cl.[5] F16B *39/02*

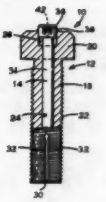
U.S. Cl. 411—271 **11 Claims**

1. A locking bolt assembly, comprising:

a. a threaded bolt having a central bore therethrough;

b. said bore having a necked down area adjacent one end of said bolt;

c. a plunger slidably received in said central bore and movable between a first bolt installation/removal position and a second bolt locking position; and



d. means for retaining said plunger in its secondbolt locking position, comprising a raised area around one end of said central bore capable of being staked down over said plunger when in its second bolt locking position.

4,976,578

FASTENING ELEMENT

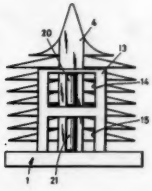
Bernhard Mathes, Buettelborn; Guenter Gosing, Ruesselsheim, and Martin Oberfrank, both of Fed. Rep. of Germany, assignors to General Motors Corporation, Detroit, Mich.

Filed Dec. 22, 1989, Ser. No. 456,105

Claims priority, application Fed. Rep. of Germany, Dec. 24, 1988, 3843765

Int. Cl.[5] F16B *21/07*

U.S. Cl. 411—512 **6 Claims**



1. A fastener means for connecting a component to an apertured panel,

said fastener means comprising a latch means connected to the component and a separate shank provided with outwardly extending ribs for insertion through the aperture in the panel and latching engagement therewith and provided with connection means for connecting the shank to the latch means, the improvement being that said latch means comprises a plurality of spaced flexible female latch members connected to the component and which together define an opening and that said connection means on said shank includes integrally formed rounded portions extending transversely of said shank, said shank being force fittingly connected to said latch means by aligning said rounded portions with the opening in said latch means and then axially moving said shank to force the rounded transversely extending portions past the flexible latch members until said portions are seated, said latch members being configured such that transverse movement of said shank relative to said latch means is permitted, said rounded portions of said shank being disengageable from said female latch means prior to disengagement of said shank from said panel when a pulling force is exerted on said component connected to said female latch means.

4,976,579

FLASK ASSEMBLY FOR CONTAMINATED OBJECTS

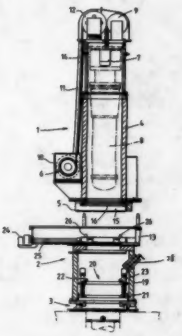
James Jones, Warrington, United Kingdom, assignor to British Nuclear Fuels plc, Warrington, England

Filed Apr. 12, 1989, Ser. No. 337,057

Claims priority, application United Kingdom, Apr. 21, 1988, 8809433

Int. Cl.[5] G21F *5/00*

U.S. Cl. 414—146 **5 Claims**



1. A flask assembly for the transfer of objects into and out of an enclosure comprising a levelling system adapted to sit over a posting port in the enclosure, a stool assembly positioned on the levelling system, a lower gamma gate at the end of the stool assembly remote from the levelling system, a flask body removably mounted on the stool assembly, an upper gamma gate on the flask body cooperable with the lower gamma gate on the stool assembly, winch means on the flask body for flasking objects through the posting port, and a shock absorber unit housed within the stool assembly.

4,976,580

STORAGE MEANS, ESPECIALLY PARKING MEANS

Edward Knakrick, Schlachthausgässchen 6, 8900 Augsburg, Fed. Rep. of Germany

PCT No. PCT/EP87/00475, § 371 Date Feb. 16, 1989, § 102(e) Date Feb. 16, 1989, PCT Pub. No. WO88/01331, PCT Pub. Date Feb. 25, 1988

PCT Filed Aug. 22, 1987, Ser. No. 332,453

Claims priority, application Fed. Rep. of Germany, Feb. 22, 1986, 8620486[U]

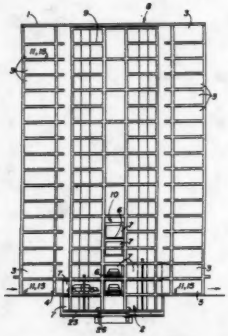
Int. Cl.[5] E04H *6/00*

U.S. Cl. 414—254 **13 Claims**

1. A storage device comprising:

a deposit station; a removal station; and plurality of storage stations having a deposit and removal opening; transport means for transporting an item from adjacent the deposit station to adjacent one of said plurality of storage stations and for transporting an item from adjacent one of said plurality of storage stations to adjacent the removal station said transport means including a transport floor with grate elements defining intervening floor running support surfaces; and, transfer means for transferring the item from adjacent one of said plurality of storage stations to within one of said plurality of storage stations and for transferring an item from within one of said plurality of storage stations to adjacent one of said plurality of storage stations, said transfer means including a transfer grate having parallel grate arms connected to each other by a

ty-bar, a lifting mechanism connected to the grate arms and a traversing mechanism connected to each grate arm, said traversing mechanism including running gears for moving the transfer grate horizontally, each of said stations including a station floor having grate elements defining intervening floor running support surfaces, each of the



transport means floor grate elements and station floor grate elements interfitting with the grate arms of the transfer grate, said transfer grate arms running gears being engageable with each of said transport floor and station-floor running support surfaces so that the transfer grate may be moved into the station grate elements and lifted and lowered with respect to the station grate elements.

4,976,581

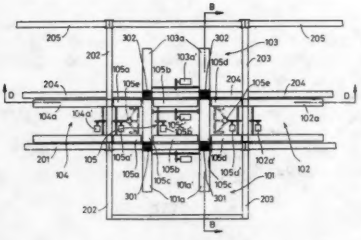
MULTI-STORIED PARKING APPARATUS

Shun C. Wu, 13F, No. 501, Tunhua South Road., Taipei, Taiwan

Filed Nov. 2, 1988, Ser. No. 265,902

Int. Cl.[5] E04H *6/00*

U.S. Cl. 414—257 **9 Claims**



1. A vehicle parking apparatus comprising:

a multi-storied building having at least one parking position on each of its stories;

at least one transporting means for moving a vehicle, said transporting means comprising:

a means for vertically moving said vehicle to any of said stories, said vertical moving means comprising:

a central portion; and

four primary sides, each of said primary sides being capable of adjoining one of said parking positions, said four primary sides being a front, a rear, a left and a right side with respect to a car positioned in said central portion;

a means for conveying said car between each of said central portions and said parking positions adjoining any one of said four primary sides comprising:

four pairs of reversible conveying belts located on said central portions being positioned such that one pair of said belts extends in parallel from right to left side, with three sets of additional parallel pairs extending from front to rear and intersecting said one pair of said belts; and

a pair of parallel extending reversible conveying belts located on each of said parking positions and being operably aligned with said belts positioned on said central portion, said belts being capable of combining to carry four wheels of said car;

a connector mounted between said right and left sides and the respective adjoining parking position such that said conveying means is capable of smoothly conveying the car between said central portions and said respective parking positions; and

a pair of front and rear wheel-pushers provided for urging said car to move toward said front and rear primary sides and being positioned on said control portion so as to be on opposite sides of said car.

4,976,582

DEVICE FOR THE MOVEMENT AND POSITIONING OF AN ELEMENT IN SPACE

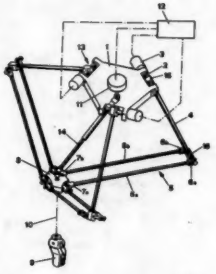
Reymond Clavel, Ecublens, Switzerland, assignor to Sogeva S.A., Switzerland

Continuation of Ser. No. 96,113, Aug. 13, 1987, abandoned. This application Sep. 6, 1989, Ser. No. 403,987

Claims priority, application Switzerland, Dec. 16, 1985, 5348/85

Int. Cl.[5] B25J *9/12*

U.S. Cl. 414—729 **25 Claims**



1. A device for the movement and positioning of an element in space, comprising:

at least one base member;

at least one movable member;

at least three actuators, each actuator comprising a fixed portion, substantially immovably fixed on the base member, and a moving portion having a single degree of freedom with respect to said fixed portion; and

means fixing in space the inclination and orientation of the movable member with respect to the base member for all motions of the moving portions of the actuators, said fixing means comprising at least three linking means respectively connecting the moving portion of each actuator to the movable member, each of the linking means having a first end mounted by articulation onto the moving portion of its respective actuator and a second end mounted by articulation onto the movable member, the device providing two and only two degrees of freedom between the first end of each linking means and the moving portion of its respective actuator, the device providing

two and only two degrees of freedom between the second end of each linking means and the movable member.

4,976,583

METHOD FOR UNBINDING A STACK OF SACKS

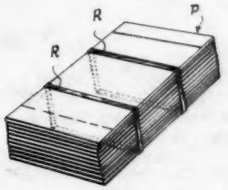
Mario Moltrasio, Via Ruvigliana, 12, Viganello, Switzerland

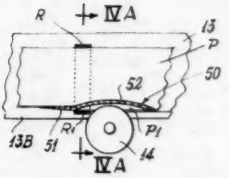
Filed Jan. 26, 1990, Ser. No. 470,910

Claims priority, application Italy, Jan. 31, 1989, 19266 A/89

Int. Cl.[5] B72D *7/02*; B65B *69/00*

U.S. Cl. 414—786 **8 Claims**





1. A method for supplying a stack of sacks which are bound into packs by at least one binding, to a sack application device for the purpose of applying the sacks to a delivery nozzle for granular material which is to form the sack contents, characterized in that the packs (P) are unbound either in the sack application device or during their travel towards this device by the steps of: first forming a region (P1) in which the binding (R) is separated from the packs (P), then making a cut in the binding (R) in said region (R1), and then removing the cut binding while the sacks remain in said stacked configuration.

4,976,584

APPARATUS FOR LOADING CARTONS ONTO PALLETS

Heinz Focke, Verden, Fed. Rep. of Germany, assignor to Focke & Co. (GmbH & Co.), Verden, Fed. Rep. of Germany

Continuation of Ser. No. 266,250, Oct. 28, 1988, abandoned, which is a continuation of Ser. No. 39,868, Apr. 20, 1987, abandoned. This application Oct. 19, 1989, Ser. No. 423,748

Claims priority, application Fed. Rep. of Germany, Apr. 18, 1986, 3613089

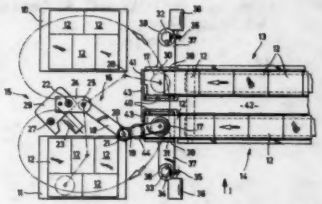
Int. Cl.[5] B65G *61/00*

U.S. Cl. 414—789.6 **4 Claims**

1. Apparatus for transferring articles, such as cartons, between a delivery or receiving plane and a depositing plane at a changing level, and for transferring cartons supplied by delivery conveyors onto pallets, with an automatically operating, vertically movable pivoting conveyor receiving at least one carton each time, characterized in that the arriving cartons (12) or the like can be fed to the pivoting conveyor (15) by an elevator, in such a way that the carton (12) is taken up by the pivoting conveyor (15) in a take-up plane between the delivery or receiving plane and the depositing plane;

in that at least two delivery conveyors (13, 14), each with a raisable and lowerable platform (30, 31), are assigned to a common pivoting conveyor (15) and are served alternately by said pivoting conveyor; and

in that a fixed lateral guide (42) is arranged between the delivery conveyors and at the end has two transversely



directed stop legs (43) for the cartons (12) on the platforms (30, 31).

4,976,585

SYSTEM FOR THE RAPID BALANCING OF REVOLVING SHAFTS, PARTICULARLY SUITABLE FOR GAS TURBINES

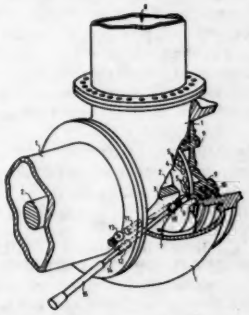
Vasco Mezzedimi, Poggibonsi, and Franco Frosini, Sesto Fiorentino, both of Italy, assignors to Nuovopignone-Industrie Meccaniche e Fonderia S.p.A., Florence, Italy

Filed Apr. 3, 1989, Ser. No. 332,546

Claims priority, application Italy, Apr. 8, 1988, 20129 A/88

Int. Cl.[5] F01D *25/00*

U.S. Cl. 415—118 **3 Claims**



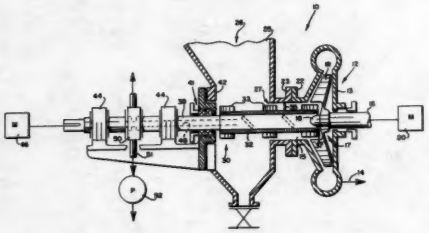
1. A turbine having a stator and a rotating shaft within the stator, wherein the shaft can be balanced within the stator of the turbine without dismantling the turbine, by selectively applying masses to the shaft, comprising a rotor attached to the shaft having a plurality of threaded bores around a circumferential region of said rotor for housing the masses, wherein the masses are complimentarily threaded for mating with said threaded bores and wherein a wall of the turbine has a first bore and a second bore wherein said first and second bores are mutually adjacent and have axes which focus upon one of said threaded bores of said rotor, wherein said first bore in said wall of the turbine is adapted to house a light source for illuminating said one of said threaded bores of said rotor and said second bore in said wall of the turbine is adapted for aligning said one of said threaded bores of said rotor with said second bore in said wall of the turbine for introducing a threaded mass attachment means for attaching said threaded mass in said threaded bore of said rotor for balancing the shaft, and wherein said turbine includes a first plug and a second plug adapted for sealing said first and said second bores in said wall of the turbine respectively after the shaft has been balanced and the mass attachment means has been removed.

4,976,586

PUMP WITH SEPARATE FLUIDIZING VANED SHAFT ADJACENT IMPELLER

Johan C. F. C. Richter, Oslo, Norway, and Ole J. Richter, Karlstad, Sweden, assignors to Kamyr AB, Karlstad, Sweden

Filed Jul. 18, 1989, Ser. No. 381,067
Int. Cl.[5] F04D 1/10
U.S. Cl. 415—143 **18 Claims**



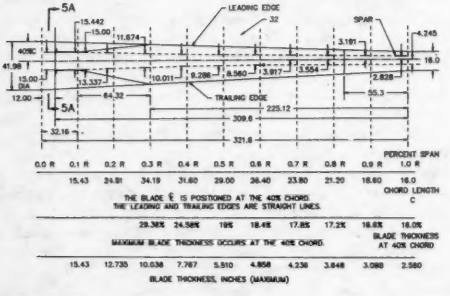
1. A pumping system for suspensions comprising:
(a) a centrifugal pump having a housing contained an impeller, the impeller having a solid hub and blades;
(b) means for rotating said impeller about an impeller axis, in a first direction of rotation;
(c) means defining an inlet to said housing, and an outlet from said housing, for suspension being pumped;
(d) an elongated vaned tubular element having an open end, said tubular element at said open end having an inside diameter greater than the diameter of said hub;
(e) means for mounting said tubular element for rotation about an axis generally in line with said impeller axis, and so that the open end extends through said inlet so that it is positioned adjacent, but spaced from, said hub, but overlapping said hub in the dimension of elongation thereof; and
(f) means for rotating said tube about its axis in a second direction of rotation, opposite said first direction.

4,976,587

COMPOSITE WIND TURBINE ROTOR BLADE AND METHOD FOR MAKING SAME

J. Ford Johnston, Sunland; William A. Farone, Irvine, and Amir Mikhail, Northridge, all of Calif., assignors to DWR Wind Technologies Inc., San Francisco, Calif.

Filed Jul. 20, 1988, Ser. No. 221,897
Int. Cl.[5] F01D 5/14
U.S. Cl. 416—230 **49 Claims**



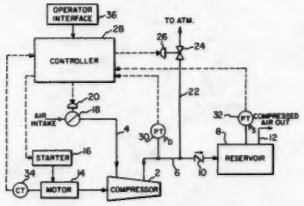
1. A wind turbine rotor blade including NASA LS(1)-04xx airfoil sections, said wind turbine blade having:
a thickness-to-chord ratio of substantially sixteen percent at full radius, said thickness-to-chord ratio increasing to substantially nineteen percent at one half full radius and substantially twenty nine percent at three-tenths full radius; and
a twist equal to zero from full radius to fifty percent full radius, said twist varying to a value no greater than eight degrees at a theoretical hub of the rotor blade.

4,976,588

COMPRESSOR CONTROL SYSTEM TO IMPROVE TURNDOWN AND REDUCE INCIDENTS OF SURGING

Bruce G. Heckel, Penn Township, Westmoreland County, Pa., assignor to Elliott Turbomachinery Co., Inc., Jeannette, Pa.

Division of Ser. No. 351,800, May 15, 1989. This application May 31, 1990, Ser. No. 531,035
Int. Cl.[5] F04B 49/00
U.S. Cl. 417—20 **10 Claims**

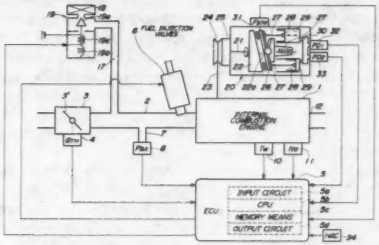


1. A method of regulating the operation of a compressor system including a compressor moving a gas from an intake conduit through a discharge conduit to a gas storage reservoir, an inlet valve in said intake conduit, an unload valve in said unload conduit, means for detecting the discharge pressure of said compressor, means for detecting the flow rate of gas from said compressor and means for detecting the system pressure in said reservoir, said method comprising the steps of:
(a) initially fully closing the unload valve and fully opening the inlet valve;
(b) closing the inlet valve by an amount necessary to maintain the discharge pressure at a constant design pressure level and to maintain the gas flow rate at a constant design flow level;
(c) detecting when said discharge pressure reaches a first pressure level set higher than said design pressure level;
(d) thereafter maintaining the inlet valve in its last position and opening the unload valve by an amount necessary to maintain the discharge pressure below said first pressure level as the gas flow rate drops below said design flow level;
(e) monitoring the position of the unload valve and measuring the period of time that the unload valve remains open beyond a predetermined position set point;
(f) fully opening the unload valve and fully closing the inlet valve if the unload valve remains open beyond the position set point for longer than a first predetermined period of time;
(g) monitoring the system pressure and comparing said system pressure with a second pressure level lower than said design pressure level; and
(h) repeating steps a–g if the system pressure drops below said second pressure level.

4,976,589
OUTPUT CONTROL SYSTEM FOR AN I.C. ENGINE RESPONSIVE TO COMPRESSOR TORQUE AND ENGINE SPEED

Yutaka Ide, Wako, Japan, assignor to Honda Giken Kogyo K.K. (Honda Motor Co., Ltd. in English), Tokyo, Japan

Filed Apr. 14, 1989, Ser. No. 339,132
Claims priority, application Japan, Apr. 22, 1988, 63-99764; Aug. 9, 1988, 63-198385
Int. Cl.[5] F04B *17/06*; F02M *23/06, 23/08, 23/10*
U.S. Cl. 417—34 16 Claims



1. In an output control system for an internal combustion engine for an automotive vehicle having a compressor installed therein and driven by said engine, said compressor having capacity thereof being variable, said output control system having engine output-increasing means for increasing output torque of said engine by means of an engine output incremental value in response to operation of said compressor, the improvement comprising:

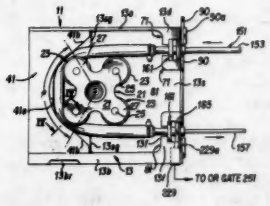
load torque-detecting means for detecting load torque produced by said compressor; and

incremental value-setting means for setting said engine output incremental value outputted from said engine output-increasing means, depending on output from said load torque-detecting means.

4,976,590
FLUID CONDUIT-RESPONSIVELY ADJUSTABLE PUMP ARRANGEMENT AND PUMP/CONDUIT ARRANGEMENT AND METHOD, AND FLUID CONDUITS THEREFOR

Brian E. Baldwin, 8022 S. Niagara Way, Englewood, Colo. 80112

Filed Jun. 8, 1988, Ser. No. 203,926
Int. Cl.[5] F04B *43/12*
U.S. Cl. 417—53 49 Claims



1. For use with a rotary peristatltic pump having a rotor and a stator, said stator having a conduit-engageable guide surface facing said rotor and defining a peristaltic pumping path for a fluid conduit, means for rotating said rotor in peristaltic pumping relation relative to said stator, and two conduit-anchoring elements for effectively anchoring a conduit in peristaltic pump-enabling relation between said stator and said rotor and along said peristaltic pumping path, each of said conduit-anchoring elements having a conduit-receiving opening and extending on transversely opposite lateral sides of said conduit-receiving opening, the arrangement comprising

a fluid conduit having a rotor/stator-engageable peristaltic pumping section engageable in peristaltic pumping relation between said stator and said rotor,

said fluid conduit having two transverse anchor flange means spaced apart thereon, with said peristaltic pumping section disposed longitudinally therebetween, for anchored retention of said conduit peristaltic pumping section in operative mounted relation along said peristaltic pumping path,

said transverse anchor flange means being selectively laterally slidably removably engageable in effectively anchoring relation with said conduit-anchoring elements and with said peristaltic pumping section extending along said peristaltic pumping path, to thereby effectively anchor said pumping section of said conduit relative to said stator, and in peristaltic pump action enabling relation between said stator and said rotor when said transverse anchor flange means are in effective engagement within said conduit anchoring elements,

each of said transverse anchor flange means having an outer transverse width substantially transversely complementary to the corresponding width of the said anchor slot in a respective said conduit-anchoring element,

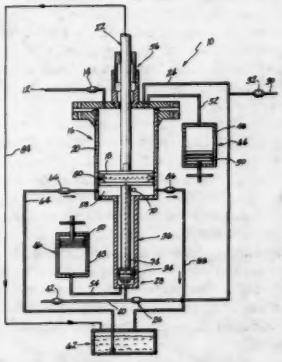
both of said transverse anchor flange means having substantially the same effective corresponding transverse width along a slot-engaging portion thereof slidably engageable in anchoring relation with the anchor slot of a respective said conduit-anchoring element, said substantially same width portion being freely and substantially similarly locationally laterally slidably complementarily and interchangeably engageable within either of said anchor slots,

both of said spaced apart transverse anchor flange means having a substantially rectangular configuration in a plane transverse to the adjoining respective portion of said conduit.

4,976,591
SELF LUBRICATING, TWO STAGE VARIABLE COMPRESSOR

Olegario Rivas, Caracas; Alejandro Newski, San Antonio de los Altos, and Simon Antunez, Caracas-Miranda, all of Venezuela, assignors to Intevep, S.A., Caracas, Venezuela

Filed Mar. 2, 1990, Ser. No. 487,308
Int. Cl.[5] F04B *39/02*
U.S. Cl. 417—254 6 Claims



1. A multi-stage compressor comprising a first piston mounted for reciprocal movement in a first cylinder and defin-

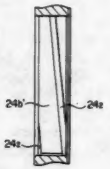
ing therewith a first compression chamber, a second piston mounted for reciprocal movement in a second cylinder and defining therewith a second compression chamber, connecting means for rigidly connecting said first piston and said second piston and defining therebetween a pumping chamber, first inlet means for delivering fluid to be compressed to said first compression chamber and first outlet means for removing compressed fluid from said first compression chamber, second inlet means in fluid communication with said first outlet means for delivering said compressed fluid to said second compression chamber for further compression and second outlet means for removing said compressed fluid from said second compression chamber, third inlet means for delivering lubricating oil from a reservoir to said pumping chamber and third outlet means for delivering lubricating fluid from said pumping chamber to said first and second pistons for lubricating between said pistons and cylinders.

4,976,592

VARIABLE CAPACITY VANE COMPRESSOR

Nobuyuki Nakajima; Kenichi Inomata; Shigeru Okada, and Kazuo Eitsi, all of Konan, Japan, assignors to Diesel Kiki Co., Ltd., Tokyo, Japan

Continuation-in-part of Ser. No. 120,152, Nov. 12, 1987, Pat. No. 4,867,651. This application Aug. 15, 1989, Ser. No. 394,118
Claims priority, application Japan, Feb. 20, 1987, 62-037646
Int. Cl.[5] F04B *49/00*
U.S. Cl. 417—295 **10 Claims**



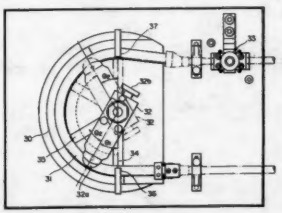
1. A variable capacity vane compressor comprising:
a cylinder formed of a cam ring and a pair of front and rear side blocks closing opposite ends of said cam ring, one of said front and rear side blocks having at least one first inlet port and an annular recess formed therein;
a rotor rotatably received within said cylinder;
a plurality of vanes radially slidably fitted in respective slits formed in said rotor;
a housing defining a suction chamber and a discharge pressure chamber therein;
wherein compression chambers are defined between said cylinder, said rotor and adjacent ones of said vanes vary in volume with rotation of said rotor for effecting suction of a compression medium from said suction chamber into said compression chambers through said at least one first inlet port, and compression and discharge of said compression medium;
at least one second inlet port formed in said one of said front and rear side blocks which has said at least one first inlet port formed therein, said at least one second inlet port being located adjacent a corresponding one of said at least one first inlet port, and communicating said suction chamber with at least one of said compression chambers which is on a suction stroke;
a pressure chamber formed in said one of said front and rear side blocks, and communicating with a zone under lower pressure and a zone under higher pressure;
an annular control element angularly displaceably received within said annular recess of said one of said front and rear side blocks;
said control element having a pressure receiving portion slidably received within said pressure chamber and dividing said pressure chamber into a first pressure chamber communicating with said zone under low pressure and a second pressure chamber communicating with said zone under high pressure;
biasing means engaging with said control element and urging same in a direction of increasing the opening angle of said at least one second inlet port;
said control means being angularly displaceable in response to a difference in pressure between said first and second pressure chambers and the biasing force of said biasing means to vary the opening angle of said at least one second inlet port, to thereby cause a change in the timing of commencement of the compression of said compression medium and hence vary the capacity of said compressor;
positioning means provided at a radially inner portion of said control element and radially supporting said control element at the whole circumference thereof to radially position said control element in place within said annular recess of the one of the front and rear side blocks with reference to said radially inner portion of said control element;
a rotary shaft extending through said rotor along an axis thereof for rotatively driving same;
said control element having a central bore formed therethrough and fitted on said rotary shaft;
said positioning means comprising an annular projection formed on an inner peripheral surface of said central bore and held in contact with said rotary shaft; and
at least one oil groove formed in said inner peripheral surface of said central bore, said at least one oil groove having one end thereof opening in an end face of said control element and the other end thereof opening in the other end face of said control element.

4,976,593

PULSATILE FLOW DELIVERY APPARATUS

Alfonso T. Miyamoto, Fukuoka, Japan, assignor to Meddiss, Incorporated, Fukuoka, Japan

Continuation-in-part of Ser. No. 114,427, Oct. 29, 1987, abandoned. This application Apr. 7, 1989, Ser. No. 334,577
Claims priority, application Japan, Dec. 3, 1986, 61-288363; Jan. 22, 1987, 62-7942[U]
Int. Cl.[5] F04B *43/12*
U.S. Cl. 417—476 **9 Claims**



1. A pulsatile flow delivery apparatus, comprising:
(a) a horse shoe shaped raceway having an inner side of a prescribed curvature;
(b) a tube for flowing a fluid therethrough, said tube having a pump head portion disposed along the inner side of said raceway;
(c) milking means comprising a pivot shaft, a rotating arm fixedly secured to said shaft and a single milking roller rotatably mounted on one end of said rotating arm, said milking means being disposed so that, as said rotating arm rotates, said milking roller travels along the inner side of said raceway to squeeze said pump head portion of said tube against said raceway, to thereby milk the pump head portion intermittently as said rotating arm rotates;
(d) occlusive clamp means for opening and closing a portion

of said tube downstream said pump head portion, said clamp means including a stationary component, a mobile component disposed in opposed relation to said stationary component, and an actuator connected to said mobile component for moving said mobile component toward and away from said stationary component to clamp and release said downstream portion of said tube; and

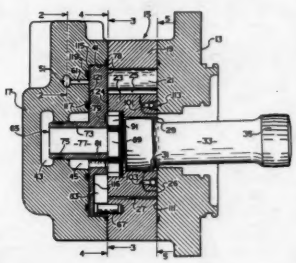
(e) control means connected to said actuator of said clamp means for controlling timing for opening and closing said clamp means to thereby cause said fluid to flow from said tube in a pulsatile fashion, said control means comprising inlet sensing means for producing an inlet signal to open said clamp means after said roller travels a predetermined curvature angle along said raceway, and outlet sensing means for producing an outlet signal to close said clamp means just before said roller leaves said raceway.

4,976,594

GEROTOR MOTOR AND IMPROVED PRESSURE BALANCING THEREFOR

Marvin L. Bernstrom, Eden Prairie, Minn., assignor to Eaton Corporation, Cleveland, Ohio

Filed Jul. 14, 1989, Ser. No. 380,053
Int. Cl.[5] F03C 2/08; F04C 2/10
U.S. Cl. 418—61.3 **14 Claims**



1. A rotary fluid pressure device of the type including housing means defining a fluid inlet port and a fluid outlet port; a rotary fluid displacement mechanism including a ring member having a plurality of internal teeth, and a star member defining one axial end surface and another axial end surface and having a plurality of external teeth, said star member being eccentrically disposed within said ring member for orbital and rotational movement therein, the teeth of said ring member and said star member interengaging to define expanding and contracting fluid volume chambers in response to said orbital and rotational movement; valve means cooperating with said housing means to define a main fluid flow path providing fluid communication between said fluid inlet port and said expanding volume chambers and between said contracting volume chambers and said fluid outlet port; output shaft means and means operable to transmit torque from said star member to said output shaft means; said valve means including a stationary valve member comprising a plate-like member disposed to be axially movable relative to said housing means and adjacent said one axial end surface of said star member, said stationary valve member defining a plurality of fluid passages, each of said fluid passages being in fluid communication with one of said fluid volume chambers; and said housing means defining a wear surface disposed adjacent said another axial end surface of said star member; characterized by:

(a) said stationary valve member including a transverse surface disposed oppositely from the surface of said stationary valve adjacent said one axial end surface of said star member, said transverse surface and adjacent surface of said housing means cooperating to define a pressurized region, said housing means defining fluid passage means communicating between said fluid inlet port and said pressurized region, pressurized fluid in said region biasing at least a portion of said stationary valve member toward said star member;

(b) said another end surface of said star member and said wear surface cooperating to define a fluid chamber having an area B; and

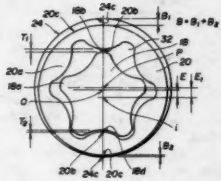
(c) means defining a first fluid passage communicating pressurized fluid from said main fluid flow path, upstream of said fluid displacement mechanism, to said fluid chamber to provide a fluid pressure bias of said star member toward said stationary valve member.

4,976,595

TROCHOID PUMP WITH RADIAL CLEARANCES BETWEEN THE INNER AND OUTER ROTORS AND BETWEEN THE OUTER ROTOR AND THE HOUSING

Katuhico Taniguchi, Hamamatsu, Japan, assignor to Suzuki Jidosha Kogyo Kabushiki Kaisha, Shizuoka, Japan

Filed Mar. 22, 1989, Ser. No. 327,291
Claims priority, application Japan, Mar. 31, 1988, 63-79150
Int. Cl.[5] F04C 2/10
U.S. Cl. 418—171 **7 Claims**



1. A trochoidal pump, comprising:

a pump housing having means defining a substantially circular bore therein, an annular outer rotor rotatably disposed in said bore and supported for radial movement therein, said annular outer rotor having a radially inwardly facing surface which defines a central opening therein substantially in the shape of a trochoid, said radially inwardly facing surface defining a plurality of radially inwardly projecting teeth which are spaced circumferentially uniformly around said central opening of said annular outer rotor, said inwardly facing surface having a plurality of radially inwardly opening concave recesses, each said recess being located circumferentially between a respective pair of said inwardly projecting teeth such that said teeth and said recesses are alternately circumferentially disposed, a disk-like inner rotor rotatably supported in said pump housing bore and positioned in said central opening of said outer rotor, said inner rotor being fixed against radial movement in said bore and having a radially outwardly facing peripheral surface which substantially defines a trochoid, said radially outward facing surface of said inner rotor defining a plurality of radially outwardly projecting teeth which cooperate with said radially inwardly opening recesses of said outer rotor, said radially outwardly projecting teeth being spaced circumferentially uniformly around the outer periphery of said inner rotor, said radially outwardly facing surface including a plurality of radially outwardly opening concave recesses which cooperate with said radially inwardly projecting teeth of said outer rotor, each said radially outwardly opening recess being located circumferentially between a respective pair of said radially outwardly projecting teeth such that said teeth and said recesses are alternately circumferentially disposed, said inner and outer rotors being arranged relative to each other and relative to said pump housing bore such that geometric centers of said rotors and said bore lie on a straight line, said outer rotor having an outer diameter which is less than an inner diameter of

said pump housing bore such that a first radial clearance is defined in said bore radially outside of said outer rotor, said rotors being rotatably arranged in said bore such that one of said inwardly projecting teeth of said outer rotor periodically radially oppose one of said outwardly projecting teeth of said inner rotor along said straight line while another of said inwardly projecting teeth of said outer rotor is simultaneously radially received along said straight line in one of said recesses of said inner rotor, said one recess of said inner rotor being diametrically opposite said one tooth thereof, said inner rotor being dimensioned such that a second radial clearance is defined along said straight line between said inner and outer rotors when said teeth thereof are radially opposed along said straight line, said first radial clearance being larger than said second radial clearance, said outer rotor being radially movable along said straight line relative to said inner rotor and said pump housing for a distance equal to said second radial clearance such that an amount of radial separation between said opposed teeth of said inner and outer rotors along said straight line if variable; and

adjustment means for increasing the amount of separation along said straight line between said opposed teeth by effecting movement of said outer rotor along said straight line.

4,976,596

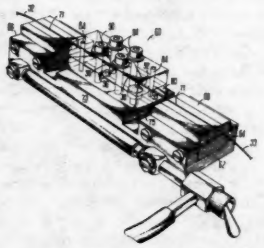
APPARATUS FOR RECOATING SPLICED LENGTHS OF OPTICAL FIBERS

Ralph J. Darsey, Lawrenceville, and William J. Hurd, Stone Mountain, both of Ga., assignors to AT&T Bell Laboratories, Murray Hill, N.J.

Division of Ser. No. 133,579, Dec. 16, 1987, Pat. No. 4,865,411. This application Jul. 7, 1989, Ser. No. 376,772

Int. Cl.[5] B29C *35/08*

U.S. Cl. 425—117 **2 Claims**



1. An apparatus for recoating end portions of lengths of optical fiber which have been spliced together, said apparatus including:

chuck means for holding portions of lengths of fibers adjacent to end portions thereof which are spliced together;

mold means providing a passageway in which are received the end portions which are spliced together and portions of the optical fibers between those held in said chuck means and the end portions;

injection means for introducing a curable recoating material into said passageway to recoat the end portions;

radiation means for emitting energy toward engagement with the recoated portions of the optical fibers to cure the recoating material, said mold means being comprised of a material which is transparent to energy emitted by said radiation means; and

reflective means for reflecting radiant energy moved past the recoated end portions and effective to cause the reflected radiant energy to engage portions of the recoated portions not directly engaged by energy from said radiation means, said reflective means comprising a curved surface wherein said curved surface has a parabolic configuration having a focal point disposed external to an area bounded by said parabolic configuration and a line which connects end points of said parabolic configuration and wherein the passageway and reflective surface are positioned relative to each other such that the passageway is disposed at the focal point of the parabolic reflecting surface, said mold means being disposed between said radiation means and said reflective means.

4,976,597

APPARATUS FOR INSERTING STICKS INTO ICE CREAM BODIES

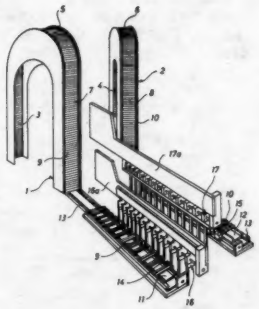
Gert Schultz, Hillerød, Denmark, assignor to Stormax International A/S, Lynge, Denmark

Filed Dec. 1, 1989, Ser. No. 444,266

Claims priority, application Denmark, Dec. 2, 1988, 6745/88

Int. Cl.[5] A23G *9/26, 9/28*

U.S. Cl. 425—126.2 **4 Claims**



1. Apparatus for inserting sticks into ice cream bodies formed by portions of ice cream being filled into mould cavities open at the top and continuously or stepwise passing below the stick inserting apparatus, said apparatus comprising a stick feeding mechanism feeding sticks to a conveyor which reciprocates relative to said feeding mechanism and which advances the sticks to a set of receiving means gripping and removing said sticks from the conveyor, and where a set of inserting means are provided which remove the sticks from the receiving means so as to insert said sticks into the mould cavities, wherein two feeding mechanisms are provided for feeding their respective conveyor, said conveyors being associated with their respective set of receiving means and their respective set of inserting means, and wherein the sets of inserting means are disposed such that alternately they are moved into and insert the sticks in one and the same vertical inserting plane in the apparatus.

4,976,598

INJECTION MOLDING MACHINE

Karl Hehl, Arthur-Hehl-Strasse 32, D-7298 Lossburg 1, Fed. Rep. of Germany

Filed Mar. 31, 1989, Ser. No. 331,375

Claims priority, application Fed. Rep. of Germany, Apr. 2, 1988, 3811298; Dec. 31, 1988, 3844434

The portion of the term of this patent subsequent to Oct. 4, 2005, has been disclaimed.

Int. Cl.[5] B29C *45/76, 45/17*

U.S. Cl. 425—135 **11 Claims**

1. In an injection molding machine including

a main structure having an area outlined by overall dimensions as viewed in a vertical projection, a rear zone, a front

zone and a lateral, operator's control zone; said main structure including

a pedestal including a top cover defining a plane;

a horizontally operable mold clamping unit supported on said pedestal;

an injecting unit supported on said pedestal and having a vertical longitudinal plane of symmetry;

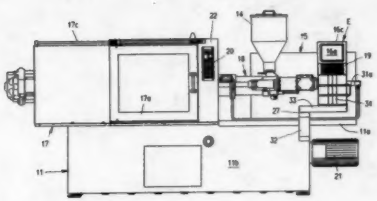
a control cabinet situated in said rear zone and having an underside;

an input unit situated in said operator's control zone; said input unit including a data display device and an input keyboard;

a cable connecting said input unit with said control cabinet;

the improvement comprising

post means supported on said pedestal and defining a vertical pivot axis;



a swivel arm mounted on said post means and swingable in a horizontal plane about said vertical pivot axis; said swivel arm being situated closely above said top cover of said pedestal; said input unit being secured to said swivel arm and being situated thereabove such that said data display device is approximately at eye-level height; said input unit having, dependent upon pivotal positions of the swivel arm, a working position situated externally of said area of the main structure and a position of rest within said area; and

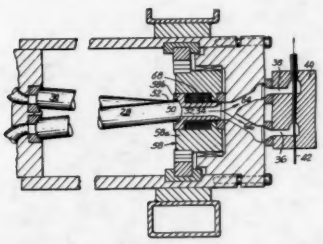
connecting means for fixedly attaching said control cabinet to said pedestal; said underside of said control cabinet being at least approximately coplanar with the plane defined by said top cover.

4,976,599

APPARATUS FOR EXTRUDING A SHEATH OF SYNTHETIC MATERIAL AROUND A CONDUCTOR AND FOR CHANGING THE COLOR OF SAME

David Pepe, Meriden, Conn., assignor to Davis Electric Wallingford Corporation, Wallingford, Conn.

Filed Jun. 1, 1989, Ser. No. 359,906
Int. Cl.[5] B29C *47/04, 47/10*
U.S. Cl. 425—131.1 **21 Claims**



1. Apparatus for directing at least two flows of synthetic material from extruder means to an extruder head, which comprises:

means defining at least two separate conduits, each said conduit being movable between first and second positions relative to said extruder head, each said conduit further having an inlet end and an outlet end, each said conduit communicating at its inlet end with a corresponding extruder outlet opening and at its outlet end with a corresponding extruder head inlet opening; and

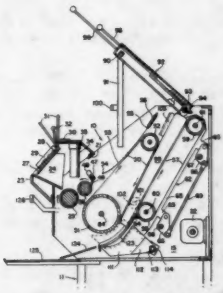
means for changing the position of each outlet end of said conduits for communication with a different extruder head inlet opening by moving said conduits from said first position to said second position.

4,976,600

BREAD MOLDERS

Paul E. Willett, Queensland, Australia, assignor to APV Baker Pty Ltd., Victoria, Australia

Filed Jun. 19, 1989, Ser. No. 367,667
Claims priority, application Australia, Jun. 21, 1988, PI8893
Int. Cl.[5] A21C *3/02;* **B29C** *43/46*
U.S. Cl. 425—151 **2 Claims**



1. A bread molder having a feed chute with an inlet for receiving dough pieces and directing them to fall between counter-rotating sheet rollers for flattening the dough and delivering it to an apparatus for working and discharging the dough, wherein:

the feed chute has sides, a back and a front, a shaft rotatable by a handle being mounted across the back of the feed chute,

a shutter is pivoted on th shaft, is spring-biased to a closed position extending forwards across the inlet to the feed chute and is adapted to be pivotally moved down into the feed chute under impact from a dough piece thrown manually onto the shutter to allow the dough piece to pass through the feed chute,

two spaced parallel freely rotatable guide rollers perpendicular to the shaft are adapted to guide between them a dough piece thrown onto a central part of the shutter,

restricted openings in the shutter to both sides of the two rollers are adapted to accept dough pieces fed in pairs through them to the feed chute and the sheeting rollers, and

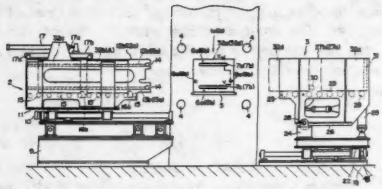
a safety gate comprising two grilles fixed to and radiating from the shaft at an acute angle to each other is adapted to be swung, by rotation of the shaft, into the feed chute, clearing the guide rollers, and causing one grille to depress the shutter into the feed to sweep to the sheeting rollers any dough piece lodged in the fed chute, the other one of the grilles at the same time moving to form a safety barrier above the sheeting rollers.

4,976,601

DIE EXCHANGER OF MOLDING APPARATUS

Kozo Tsuruta, and Yuichi Yamada, both of Aichi, Japan, assignors to Aisin Takaoka Co., Ltd., Toyota, Japan

Filed Jan. 2, 1990, Ser. No. 459,459
Claims priority, application Japan, Apr. 27, 1989, 1-105965
Int. Cl.[5] B29C *39/04, 45/04*
U.S. Cl. 425—182 16 Claims



1. A die exchanger of a molding apparatus, comprising:

a die plate having clamp means which has a groove, guides a die by means of pin means provided on the die and fastens the die at a predetermined position;

a die carrying-in apparatus arranged on one side of said die plate; and

a die carrying-out apparatus arranged on the other side of said die plate and opposite to said die carrying-in apparatus,

said die carrying-in apparatus having at least one guide groove which engages the pin means of the die and guides a plurality of corresponding dies, said die carrying-in apparatus having a first support plate movable forward and backward to said die plate so that the guide groove is connectable to the groove in the clamp means,

said die carrying-out apparatus having a second support plate movable forward and backward to said die plate so that the second support plate can receives the die engaging the clamp, the second support plate movably supporting the die,

said die carrying-in apparatus having one-way feed means for feeding each of the corresponding dies which is supported by means of the guide groove on the first support plate to said die plate.

4,976,602

MOTOR-OPERATED DIE CLAMPING MECHANISM OF AN INJECTION-MOLDING MACHINE

Seiji Yamazaki, Hachioji, Japan, assignor to Fanuc Limited, Yamanashi, Japan

PCT No. PCT/JP88/00180, § 371 Date Sep. 21, 1988, § 102(e) Date Sep. 21, 1988, PCT Pub. No. WO88/06963, PCT Pub. Date Sep. 22, 1988
PCT Filed Feb. 19, 1988, Ser. No. 254,659
Claims priority, application Japan, Mar. 13, 1987, 62-56884
Int. Cl.[5] B29C *45/66*
U.S. Cl. 425—188 7 Claims

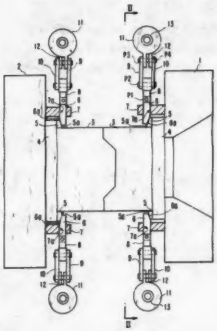
1. A motor-operated die clamp mechanism of an injection-molding machine, said injection molding machine having a movable board, a stationary board and first and second dies detachably coupled to the movable board and stationary board respectively, said die clamp mechanism comprising:

a plurality of pressure means disposed individually on said stationary board and said movable board of the injection-molding machine so as to be movable toward and away from said first and second dies for detachably coupling said first and second dies;

a plurality of motor means corresponding to said plurality of pressure means; each motor means providing a rotary force; and

a plurality of transmission means corresponding to said plurality of motor means, said transmission means amplifying the rotary force, converting the rotary force into a rectilinear driving force and transmitting said rectilinear driving force to each pressure means;

wherein each said die has a mold base formed with a plurality of fixed wedges on a peripheral edge portion thereof; each said pressure means includes movable wedges arranged for rectilinear motion so as to be movable toward and away from said fixed wedges, and each movable wedge having a slanting surface adapted to be in sliding contact with a slanting surface formed on each said fixed wedge corresponding thereto;



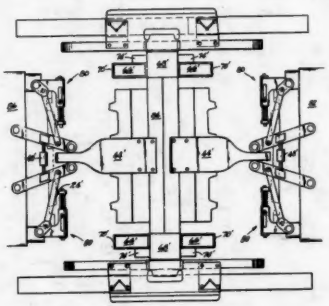
wherein each said transmission means includes a ball screw being integrally movable and having first and second screw portions threaded reversely to each other, said ball screw being operatively coupled to said corresponding motor means; first and second ball nuts threadedly engaged with said first and second screw portions, respectively; and link means coupling said first and second ball nuts to corresponding ones of said movable wedges, said link means being adapted to spread or contract in accordance with a rotating direction of said corresponding motor means, thereby causing said movable wedge to make a rectilinear motion.

4,976,603

PIVOTING WORKPIECE REMOVAL DEVICE

John Disimone, Woodbridge, Canada, assignor to Husky Injection Molding Systems, Ltd., Bolton Ontario, Canada

Filed May 17, 1989, Ser. No. 353,243
Int. Cl.[5] B29C *45/00*
U.S. Cl. 425—556 18 Claims



1. A molding machine for producing molded articles, said machine comprising:

first and second mold portions;

said second mold portion being movable relative to said first mold portion along a first axis between a mold open position and a mold closed position;

means for removing molded articles formed during a molding cycle from said machine;

said removing means comprising a first shaft assembly mounted to said first mold portion and an arm assembly rotatable between a first inboard position between said mold portions and a second outboard position substantially parallel to said first axis;

said first shaft assembly including a first shaft oriented substantially perpendicular to said first axis and rotatable about a second axis substantially perpendicular to said first axis;

said arm assembly including at least one suction cup for positively engaging and grasping a molded article to be removed; and

cam means for causing rotation of said first shaft about said second axis and thereby rotation of said arm assembly between said first and second positions as said mold portions move between said mold open and mold closed positions, said cam means being actuated by relative movement between said mold portions.

4,976,604

PULSE COMBUSTION APPARATUS

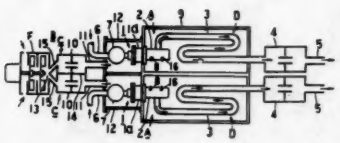
Hiroshi Nishino, Chita, Japan, assignor to Paloma Kogyo Kabushiki Kaisha, Nagoya, Japan

Continuation of Ser. No. 246,997, Sep. 20, 1988, abandoned. This application Jul. 17, 1989, Ser. No. 380,770

Claims priority, application Japan, Oct. 2, 1987, 62-249237

Int. Cl.[5] F23C *11/04*

U.S. Cl. 431—1 **2 Claims**



1. A pulse combustion apparatus having plural pulse combustion sections which may be operated separately or together so that the heat output of the apparatus may be varied by varying the number of sections which are combusting, such apparatus comprising,

(i) a single air supply section with a single air supply source including a housing and a blower which is operated at a single speed for providing a flow of air under pressure from said housing,

(ii) a plurality of combustion sections each communicating with the air supply section, the air supply section including air passages which branch out from each other at an outlet of the housing, such air passages communicating with both the housing and the respective combustion sections for admitting air from the housing into the respective combustion sections, said air passages being physically separated from each other for separating the air from the housing into streams which are not able to join together anywhere, each of said air passages having an air valve therein,

(iii) a plurality of air/fuel mixing chambers provided in the respective combustion sections, said mixing chambers being located on downstream sides of the respective air passages and

(iv) a plurality of fuel passages communicating with the respective mixing chambers, each of said fuel passages having a fuel valve therein,

each of the air passages effectively connecting the air supply source to one of the mixing chamber such that a non-combusting one of the combustion sections receives an effective flow of air from the blower operating a said single speed for starting and running normally even when a combusting one of the combustion sections is drawing air from the air supply source.

4,976,605

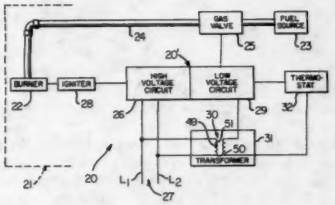
HOT SURFACE IGNITION SYSTEM FOR A GAS FURNACE, CONTROL DEVICE THEREFOR AND METHODS OF MAKING THE SAME

Frederick J. Geary, Holland, Mich., assignor to Robertshaw Controls Company, Richmond, Va.

Filed May 24, 1989, Ser. No. 356,871

Int. Cl.[5] F23N *5/00*

U.S. Cl. 431—27 **12 Claims**



1. In a hot surface ignition system for a gas furnace or the like, said system comprising a burner means, a settable thermostat means, an electrically operable gas valve, control means, and an electrically operable hot surface igniter means disposed so as to be in the path of gas issuing from said burner means that is adapted to be fed said gas from a source thereof through said gas valve when said control means has been activated by said thermostat means to operate said igniter means and said gas valve in a certain sequence, said control means having lockout means for deactivating said system should ignition of said gas issuing from said burner means not take place by the end of said certain sequence, said control means having resetting means for causing said control means to be reactivated to be adapted to repeat said certain sequence of said system when said resetting means is activated, said control means having means for selecting said certain sequence to have one or more attempts of said control means to ignite said gas at said burner means before said lockout means can deactivate said system, said means for selecting said certain sequence comprising a clock means having an input means, said control means having an electrical line means for interconnecting said thermostat means to said input

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4,976,606

THERMOPHOTOVOLTAIC TECHNOLOGY

Robert E. Nelson, Weston, Mass., assignor to TPV Energy Systems, Inc., Waltham, Mass.

Continuation of Ser. No. 168,458, Mar. 15, 1988, Pat. No. 4,826,426, which is a division of Ser. No. 815,888, Jan. 3, 1986, Pat. No. 4,764,104, which is a division of Ser. No. 634,379, Jul. 31, 1984, Pat. No. 4,584,426, which is a continuation-in-part of Ser. No. 529,016, Sep. 2, 1983, abandoned. This application Apr. 28, 1989, Ser. No. 344,695

The portion of the term of this patent subsequent to Apr. 24, 2003, has been disclaimed.

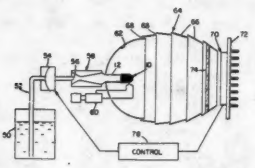
Int. Cl.[5] F23N *5/08*

U.S. Cl. 431—79 **24 Claims**

1. A thermophotovoltaic power generation system comprising a rare earth metal oxide radiator member that has a cross-sectional dimension in the range of fifty—thirty micrometers, a photovoltaic device in optically coupled relation to said radia-

tion member, said photovoltaic device having an electron production threshold,

means for thermally exciting said radiator member to cause it to emit radiation comprising a fuel supply, a fuel supply conduit connected to said fuel supply, fuel control means for controlling the flow of fuel through said fuel supply conduit, and an igniter mechanism for igniting said fuel to cause said radiator member to emit radiation that has a wavelength peak below said electron production threshold,



having a concentrated radiated flux over the 400–2500 nanometer wavelength range such that at least 50% of said radiated flux is within a band less than 400 nanometers in width, and

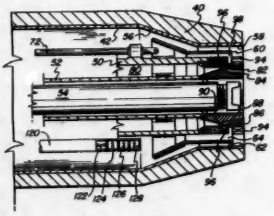
a control system connected between said photovoltaic device and said fuel control means for monitoring the output of said photovoltaic device and modulating the flow of fuel through said fuel supply conduit by control of said fuel control means to control the electrical output of said photovoltaic device.

4,976,607

BURNER APPARATUS FOR PROVIDING ADJUSTABLE FLAME GEOMETRY

Francois X. Grimard, Quebec, Canada, assignor to Fuel Tech, Inc., Stamford, Conn.

Filed Jul. 9, 1986, Ser. No. 883,711
Int. Cl.[5] F23C *5/00*
U.S. Cl. 431—174 **6 Claims**



1. A burner such as for use in a rotary kiln or the like and capable of supplying air and gaseous or liquid fuel along a burner axis from an end of the burner to a flame in a combustion zone, comprising:

first and second hollow members, said first member surrounding the other, said members being sized to form an air supply conduit therebetween which terminates at the burner end, said second member being sized to provide fuel to said zone;

one of the hollow members having first and second portions with respectively differently sized cross sections and with a transition section therebetween;

a flow control baffle disposed within the air supply conduit opposite the transition section and having a front segment that extends forwardly between the first and second hollow members to separate the air supply conduit into inner and outer air channels that are open towards said combustion zone;

said flow control baffle being mounted to move axially so as to control air flow through the air channel that borders the transition section and correspondingly adjust the burner flame wherein the cross section of said air channels comprises frustoconical surfaces on said transition section and a complementary frustoconical surface on said flow control baffle, said complementary frustoconical surface being coaxially-positioned with and axially-movable relative to said frustoconical surface on said transition section;

means for imparting said axial movement to the flow control baffle;

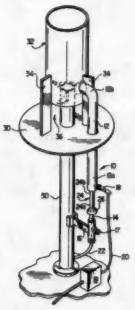
and a plurality of flame stabilizing gas jets positioned radially of said channels at said burner end nearest the combustion zone.

4,976,608

IGNITOR DEVICE

King W. Hyde, 1414 N. Belmont, Odessa, Tex. 79763

Filed Jan. 8, 1990, Ser. No. 462,090
Int. Cl.[5] F23D *14/00*
U.S. Cl. 431—202 **25 Claims**



1. An apparatus to ignite combustible gases exhausting from a flare pipe, comprising:

(a) a burner tube mounted to said flare pipe;

(b) a means to produce a spark within the burner tube at regularly timed intervals;

(c) an expansion tube of increasing inner diameter, the downstream end with the larger inner diameter fixedly attached to the upstream end of the burner tube; and

(d) an injector nozzle for injection of fuel gas into said expansion tube slidably and removably mounted in line with the upstream end of said expansion tube.

4,976,609

FLASHBACK RESISTANT INFRARED GAS BURNER APPARATUS

James T. Grob, Shreveport, La., and Richard N. Caron, Dorchester, Mass., assignors to The Frymaster Corporation, Shreveport, La.

Filed Dec. 8, 1988, Ser. No. 281,448
Int. Cl.[5] F23D *3/40*
U.S. Cl. 431—326 **18 Claims**

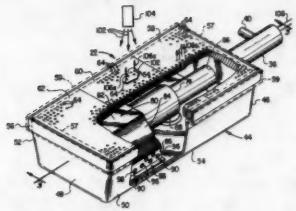
1. An improved fuel fired infrared burner comprising:

a housing having spaced apart front and rear wall portions and a wall opening extending between said front and rear wall portions, said front wall portion having an opening therein for receiving an air-fuel mixture supply pipe inserted forwardly therethrough to position an open outlet end of the pipe within a rear portion of the housing interior so that an air-fuel mixture discharged from the pipe is directed toward said rear end wall portion of said housing;

a burner plate structure retained in and covering said wall opening, said burner plate structure having opposite exterior and interior side surfaces between which a spaced

series of relatively small cross-section perforations extend for discharging from the housing an air-fuel mixture to be burned along said exterior side surface of said burner plate structure; and

mixture flow control means positioned within said housing and operative during burner startup for causing an air-fuel mixture being flowed into a rear interior portion of said housing to be initially discharged from said burner plate



structure through a front portion of said perforations therein prior to a substantial air-fuel mixture outflow through the balance of said perforations,

whereby an igniter positioned adjacent a front outer side surface portion of said burner plate structure may be used to ignite the initial air-fuel mixture outflow from said burner plate structure without a substantial risk of a hard ignition condition or an associated flame flashback into the housing interior through said burner plate structure.

4,976,610

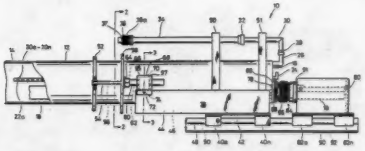
PURGE CANTILEVERED WAFER LOADING SYSTEM FOR LP CVD PROCESSES

Cleon R. Yates, Austin, Tex., assignor to CRYCO Twenty-Two, Inc., Austin, Tex.

Continuation-in-part of Ser. No. 279,844, Dec. 5, 1988. This application May 22, 1989, Ser. No. 355,753

Int. Cl.[5] F27D *3/00*

U.S. Cl. 432—11 **21 Claims**



1. Elephant tube system for substrate processing comprising:

a. rail means;

b. elephant tube vehicle including means for travel on said rail means, and an elephant tube secured to said elephant tube vehicle, said elephant tube including a hole in an end for accepting a handle of a paddle; and,

c. door-bellow means secured at one end to a midportion of said elephant tube.

4,976,611

METHOD AND APPARATUS FOR THE THERMAL TREATMENT OF WASTE MATERIALS

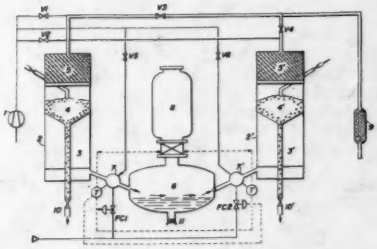
Klaus Knop, Geldern, and Günter Wolters, Duesseldorf, both of Fed. Rep. of Germany, assignors to MAN Gutehoffnungshutte, Fed. Rep. of Germany

Filed Oct. 2, 1989, Ser. No. 416,389

Claims priority, application Fed. Rep. of Germany, Oct. 1, 1988, 3833457

Int. Cl.[5] F27D *17/00*

U.S. Cl. 432—181 **11 Claims**



1. A method for thermal treatment of wastes which are combustible, poorly combustible or incombustible, especially wastes which cannot safely be dumped, comprising the steps of: preheating air to a temperature of 800° to 1200° C. in a first regenerator; feeding the preheated air to a first combustion chamber to generate heated gases; introducing wastes into a melting vessel for thermal treatment; feeding the heated gases from the first combustion chamber to the melting vessel to generate flue gas; feeding flue gas from the melting vessel to a second combustion chamber; feeding flue gas from the second combustion chamber to a second regenerator; providing each of the first and second regenerators with a section for thermal storage, a section for absorption of impurities contained in the flue gas, and a section for further treatment of the flue gas; and passing the flue gas through the section for thermal storage, the section for adsorption of impurities contained in the flue gas, and the section for further treatment of the flue gas, of the second regenerator.

4,976,612

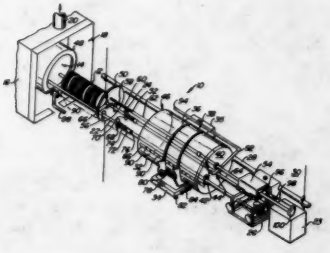
PURGE TUBE WITH FLOATING END CAP FOR LOADING SILICON WAFERS INTO A FURNACE

Kenneth H. Adams, San Jose, Calif., assignor to Automated Wafer Systems, San Jose, Calif.

Filed Jun. 20, 1989, Ser. No. 368,744

Int. Cl.[5] F27D *3/00*

U.S. Cl. 432—239 **16 Claims**



16. An apparatus for loading semiconductor wafers into a furnace, comprising:

wafer support means for supporting a plurality of wafers and advancing said wafers into the furnace;

purge tube means for substantially enclosing said wafers on said wafer support means, having an opening at a first end proximate said furnace and a substantially closed second end opposite said first end and being movable up to a position where said open end seals against an opening of said furnace; and

a pipe mounted internally near the bottom of said purge tube means for receiving, at a first end proximate said first end of said purge tube, an inert gas and distributing said inert gas into said purge tube.

4,976,613

HEAT TREATMENT APPARATUS

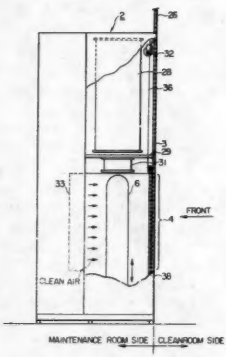
Shingo Watanabe, Kanagawa, Japan, assignor to Tel Sagani Limited, Japan

Filed Sep. 26, 1988, Ser. No. 249,780

Claims priority, application Japan, Sep. 29, 1987, 62-242497; Jan. 27, 1988, 63-14642

Int. Cl.[5] F27D *3/12*

U.S. Cl. 432—241 **12 Claims**



1. A heat treatment apparatus, comprising;

a furnace;

a process tube adapted to be introduced into said furnace from the lower side of the latter;

slide means for supporting said process tube by arms arranged in a space section below said furnace, and for horizontally reciprocating said arms between said space section below said furnace and a position outside of said space section, where said process tube is located;

first elevating means disposed in said space section below said furnace for elevating and lowering the arms of said slide means; and

second elevating means for receiving and delivering said process tube supported by the arms of said slide means with the use of an elevator, and for elevating and lowering said process tube supported on said elevator relative to said furnace.

4,976,614

REMOVABLE ORTHODONTIC APPLIANCE

Harry W. Tepper, 535 Ocean Ave. #2B, Santa Monica, Calif. 90402

Continuation-in-part of Ser. No. 11,728, Feb. 6, 1987, abandoned. This application Jul. 19, 1988, Ser. No. 221,132

Int. Cl.[5] A61C *3/00*

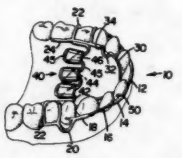
U.S. Cl. 433—18 **26 Claims**

1. A removable orthodontic appliance comprising:

a labial arch wire registrable about anterior teeth surfaces to define a limit position, the labial arch wire being of rigid material;

a pair of clasps removably engageable to midregion teeth on opposite sides of the mouth and secured to the labial arch wire at each end thereof;

lingual arch wire means of spring material including means secured at each end to the clasps; and



a transverse palatal wire arch structure coupled between the clasps and defining a bridge, the palatal arch structure being flexible in the occlusal direction and having limited expansibility, and the palatal arch structure further comprising a flexible wire having a sinuous configuration and means coupled thereto for limiting the relative expansion of the portions of the wire in the transverse direction.

4,976,615

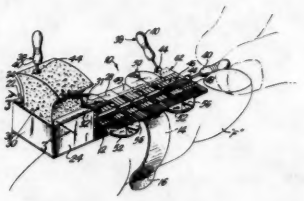
ENDODONTIC DEVICE

Leslie Kravitz, 206 Forest Ct., Carboro, N.C. 27510

Filed Oct. 5, 1989, Ser. No. 417,592

Int. Cl.[5] A61C *3/00*

U.S. Cl. 433—75 **14 Claims**



1. An endodontic device comprising:

a platform having a length greater than its width;

means connected to said platform for mounting said platform on the finger of a dentist;

said platform having an open-ended slot extending longitudinally along the length thereof, and adapted to receive a root canal instrument;

scale indicia on said platform and located adjacent to said slot to permit adjustment of the working length of said instrument while in said slot to guide the dentist in using said instrument during endodontic therapy on a patient's tooth; and

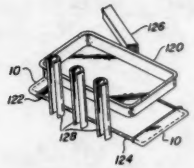
a plurality of finger-operated indexing means along at least one edge of said platform, said indexing means having indicia to permit the dentist to assign a separate indication of the working length in each root canal being worked on.

4,976,616

DENTAL TRAY HANDLE SHIELD OR PROPHYLACTIC

Mark R. Eisner, Allentown, and Charlton D. Becker, Emmaus, both of Pa., assignors to Steri-Shield Products, Inc., Ivyland, Pa.

Filed Aug. 8, 1988, Ser. No. 229,242
The portion of the term of this patent subsequent to Oct. 11, 2005, has been disclaimed.
Int. Cl.[5] A61G *15/00*
U.S. Cl. 433—77 7 Claims



1. A removable disposable dental tray or bracket table shield or prophylactic for placement over and in proximate contact with the means for adjusting the positioning or placement of said dental tray or bracket table for significantly reducing the spread of communicable diseases which may be transmitted by or through contact with human body fluids and tissues during a first and subsequent uses of the dental tray or bracket table and its adjusting means in conjunction with the treatment of two or more patients comprising a pocket portion for fitting over the dental tray or bracket table adjusting means and a collar portion for maintaining the shield in position on said adjusting means.

4,976,617

DENTAL IMPLANT SCREW DRIVER SYSTEM

Joseph E. Carchidi, 98 Westwood Dr., Whitman, Mass. 02382

Filed May 1, 1989, Ser. No. 345,667
Int. Cl.[5] A61C *3/00*
U.S. Cl. 433—141 11 Claims

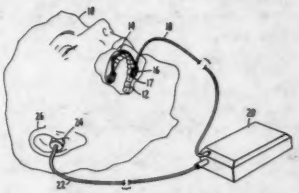
1. A screw driver system comprising a forceps holder having engagement means to engage a screw driver attachment portion, the engagement means having first and second pincers each formed with an elongated groove movable between open, unlocked and closed, locked positions, a locking mechanism to lock the pincers in the closed, locked position, a screw driver having a blade portion and an attachment portion and having a longitudinal axis extending therethrough, the screw driver attachment portion having a head portion rotatably attached to the screw driver, the head portion having an outwardly extending circular flange removably received in the grooves and securely clasped by the pincers when in the closed, locked position, the attachment portion of the screw driver removably received in the pincers so that a force can be applied to the screw driver blade along its longitudinal axis from a point laterally removed from the blade portion of the screw driver.

4,976,618

APPARATUS AND METHOD FOR TREATING TEMPOROMADIBULAR JOINT DYSFUNCTION AND BRUXISM

Kent Anderson, 4015 Creek View Ct., Rocklin, Calif. 95677

Filed May 30, 1989, Ser. No. 358,868
Int. Cl.[5] A61C *19/04*
U.S. Cl. 433—215 7 Claims



1. An intraoral sensing device, adapted for placement in the upper arch of the human mouth, for generating a detectable signal indicative of jaw muscle activity associated with nocturnal episodes of temporomandibular joint dysfunction or of bruxism, which comprises:

a flexible, unitary horseshoe-shaped appliance adapted to be received within the upper arch of the human mouth, said appliance having right and left posterior occlusal portions, which portions are adapted to be received between occlusal surfaces of the upper and lower dental arches, at least one of said posterior occlusal portions containing a separate elongate, flexible cavity whose longitudinal axis runs in a generally horizontal direction from the posterior to anterior regions of the human mouth, said elongate, flexible cavity sealed at its posterior end and open at its anterior end, said flexible cavity capable of containing a preselected volume of fluid or gas at a preselected pressure, so that a detectable pressure change is obtained when said flexible cavity volume is decreased by jaw muscle activity in response to an episode of temporomandibular joint dysfunction or of buxism, said horseshoe-shaped appliance also having an arcuate, frenum-receiving labial portion which connects the two posterior occlusal portions to obtain said horseshoe shape, and also having buccal engaging means along an outer edge of said posterior occlusal portions to maintain said occlusal portions between the posterior teeth of the upper and lower dental arches.

4,976,619

PASSIVE LOCATION METHOD

Eric J. Carlson, Mesa, Ariz., assignor to Motorola, Inc., Schaumburg, Ill.

Filed Mar. 6, 1989, Ser. No. 319,496
Int. Cl.[5] F41G *1/00, 3/26*
U.S. Cl. 434—16 22 Claims

1. A passive location method for determining the actual coordinate position of personnel and vehicles, each having a passive location device, relative to an impact point of a round of munition in a simulated battlefield for assessing injuries and damage to said personnel and vehicles inflicted by the round of munition, including a plurality of actuators for transmitting messages to said passive location device, said passive location method comprising the steps of:

initializing said passive location device with a plurality of parameters by said transmitted messages of said actuators;

setting by said passive location device an initial coordinate position of said passive location device as being located at said impact point;

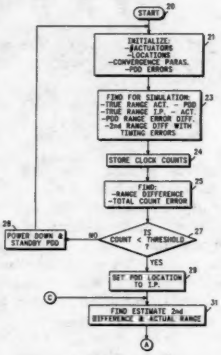
estimating by said passive location device a plurality of new coordinate positions and corresponding coordinate directions of said passive location device from a previous coor-

dinate position to produce a new candidate coordinate position, said step of estimating including the step of selecting a first one of a set of convergence parameter;

finding by said passive location device coordinate directions from said plurality of coordinate directions having a smallest error metric derived from computation of second range differences for said estimated new coordinate positions, said step of finding including the steps of:

updating ranges of said new candidate coordinate position by said selected convergence parameter; and

fifth finding an error sum for said updated ranges in each of said coordinate directions by said selected convergence parameter



determining by said passive location device a new coordinate position of said passive location device located a distance of a predetermined step size from said previous coordinate position in said coordinate directions corresponding to said smallest error metric;

iterating by said passive location device said steps of estimating, finding and determining a predetermined number of times to produce said new coordinate position which converges to the actual position of said passive location device; and

indicating by each said passive location device the affects of said round of munition on said personnel and vehicles, as having been hit or missed by said round of munition.

4,976,620

DEVICE FOR CREATING AND DISPLAYING MOIRE PATTERNS

Timothy L. Tacquard, and Patricia B. Gillfillan, both of Laguna Nigel, Calif., assignors to Patail Enterprises, Inc., Laguna Niguel, Calif.

Filed May 11, 1989, Ser. No. 350,255
Int. Cl.[5] G09B *19/00*
U.S. Cl. 434—81 **7 Claims**

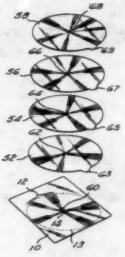
1. A device for creating and displaying moire patterns, said device consisting essentially of:

a base plate having an upper surface with a circular array of radially extending lines formed thereupon, said array having a center point and an outer circumferential edge, said the lines of the array emanating from the center point and extending outwardly to the outer circumferential edge thereof;

a plurality of partial lines which extend from points lying outside the center point of the array, said points being substantially equidistant from said center point, said partial lines terminating peripherally at the outer circumferential edge thereof;

at least one generally transparent upper plate member having at least a second array of lines marked thereon; and

said upper plate member being juxtaposable and rotationally moveable over the upper surface of said base plate such that the arrays of the lines present on said upper plate member(s) and said base plate will interact to form at least one moire pattern;



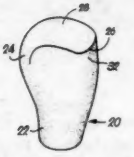
wherein said radially extending lines and said partial lines become progressively wider as they extend outwardly toward the outer circumferential edge of the array.

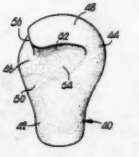
4,976,621

APPARATUS FOR STYLING HAIR REPLACEMENT

James E. Wieneke, Fairview Heights, Ill., assignor to Apollo Hair Systems, Inc., Kansas City, Mo.

Filed Dec. 27, 1988, Ser. No. 290,758
Int. Cl.[5] G09B *9/00*
U.S. Cl. 434—94 **9 Claims**





1. Apparatus for use in styling a hair replacement comprising:

a headblock having a neck portion and a head portion, the head portion presenting a surface for receiving the hair replacement in overlying relationship thereto for styling,

an edge presented by said surface, said edge defining between a scalp area and a forehead area of the head portion of the headblock,

there being a concavity extending over a significant portion of the forehead area in the headblock between the scalp area and the forehead area, said concavity presenting an upper wall extending toward the scalp area and a and a gradually sloped lower wall extending toward the forehead area, the slope of said upper wall proximal to the

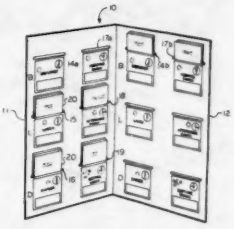
scalp area being more drastic than said gradual slope of said lower wall.

4,976,622

DIABETIC DIET PLAN AID AND METHOD

Rita M. Clark, 2317 Valleybrook Dr., Toledo, Ohio 43615

Filed Oct. 17, 1989, Ser. No. 422,591
Int. Cl.[5] G09B *19/00*
U.S. Cl. 434—127 14 Claims



3. A diet plan aid comprising a pair of panels representing two days of a daily diet

an identical arrangement of card-holding pockets on each of said panels,

each said arrangement of pockets including pockets representative of meals and snacks of a planned daily diet

said pockets of each said arrangement being aligned in its respective panel according to the sequence in time in which the respective meals and snacks of said diet are to be consumed,

a series of cards corresponding to and identifying food group choices of said diet,

said food group cards being assembled into sets matched to said respective meals and snacks of said diet

said card sets being placed in corresponding meal and snack pockets of one of said panels,

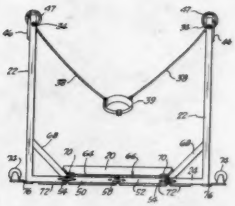
said cards each being arranged for withdrawal from its respective pocket of said one panel and transfer to the corresponding pocket of the other of said panels when the diet food which it represents is consumed whereby a current indication is provided on said one panel as to which of the diet foods were consumed while at the same time also preparing the diet program for the following day represented on said panel.

4,976,623

PORTABLE DEVICE FOR TEACHING TUMBLING

Joseph L. Owsley, 1376 Sailboat Cir., Wellington, Fla. 33414

Filed Apr. 20, 1989, Ser. No. 340,714
Int. Cl.[5] A63B *69/00*
U.S. Cl. 434—247 6 Claims



1. A device for teaching and practicing tumbling comprising:

a pair of separated horizontal and parallel side channels positioned above a tumbling plane entirely therebetween;

sliding means for sliding along the length of each channel;

a pair of straps, at least one of which is affixed to said sliding means and both of which are affixed to said sliding means;

belt means affixed to both of said straps, said belt means being of a type for affixation to the waist of a tumbler using said device;

wherein said device further includes frame means for supporting said channels and said tumbling plane; and

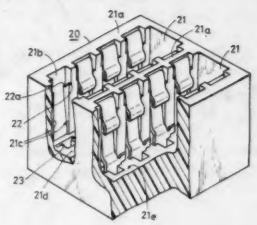
wherein said tumbling plane includes contractible floor frame means and a planar support held by said floor frame means, said planar support including a pair of panels hingedly affixed to one of said side or floor frame means, each panel being rotated to lean against one side section when said floor frame means is contracted to permit said side sections to be placed closer together for storage of said device.

4,976,624

IC SOCKET

Shinichi Ishizuka, Tachikawa; Takao Suzuki, Oume; Shoji Umesato, and Yoshikatsu Okada, both of Tokyo, all of Japan, assignors to Japan Aviation Electronics Industry Limited and NEC Corporation, both of Tokyo, Japan

Filed Jan. 17, 1990, Ser. No. 466,564
Claims priority, application Japan, Jan. 19, 1989, 1-5097[U]
Int. Cl.[5] H01R *9/09;* H05K *1/00*
U.S. Cl. 439—70 4 Claims



1. An IC socket comprising:

an insulating cover comprising a panel having a plurality of pin insertion holes arranged in at least one row, and at least one leg portion formed integrally with said panel on the underside thereof and having in its sides grooves communicating with said pin insertion holes, respectively;

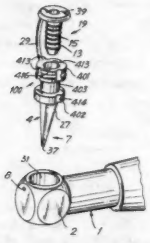
an insulating housing having at least one open-ended chamber for receiving therein said leg portion of said insulating cover, said chamber having a bottom and an inner wall surface in which engaging recesses are formed; and

a plurality of contractors arranged in said chamber, each of said contactors having a pair of opposed end portions, one end portion of each contactor being bent and folded back in the direction of insertion of said leg portion into said chamber to define a folded-back portion that is located in spaced relation to the bottom of said chamber, the other end portion of said contactor being held at the bottom of said chamber, each said contactor having lugs projecting outwardly form both marginal edges of said contactor near the bent portion thereof, and each said contactor also having a pin contact portion formed on said folded-back portion, said contactors being arranged along the inner wall surface of said chamber with said bent portion of each said contactor held in contact with said inner wall surface of said chamber, said lugs of each said contactor being engaged with said engaging recesses.

4,976,625
INHERENTLY NONROTATING RECIPROCATING DENTAL TOOL

Bernard Weissman, 225 E. 48th St., New York, N.Y. 10017

Continuation-in-part of Ser. No. 179,332, Apr. 8, 1988. This application Jul. 18, 1988, Ser. No. 220,870
The portion of the term of this patent subsequent to Sep. 4, 2007, has been disclaimed.
Int. Cl.[5] A61C 1/07
U.S. Cl. 433—118 13 Claims

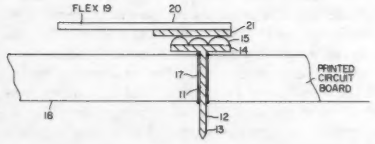


1. In a dental device comprising a drive head, an internal channel defined within said drive head, reciprocating drive means extending into said internal channel, and designed to provide reciprocating motion to a dental tool, and a dental tool having a shank and a blade portion, said shank portion being retained in said internal channel, the improvement comprising a protrusion extending radially inwardly into the head channel, and wherein the shank is formed integral with the blade and wherein the shank comprises an indented drive portion designed to hold the reciprocating drive means, a flange portion having an enlarged diameter and designed to fit slidably but snugly within the internal channel, and a plurality of grooves along said flange portion extending substantially parallel to the axis of the shank and designed to snugly hold the protrusion from the drive head, the dental tool being thus restrained from rotary motion.

4,976,626
CONNECTOR FOR CONNECTING FLEXIBLE FILM CIRCUIT CARRIER TO BOARD OR CARD

Eric P. Dibble, Endicott, and Alan D. Knight, Newark Valley, both of N.Y., assignors to International Business Machines Corporation, Armonk, N.Y.

Filed Dec. 21, 1988, Ser. No. 287,236
Int. Cl.[5] H01R 9/09
U.S. Cl. 439—67 13 Claims

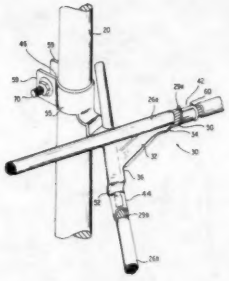


1. A connector for connecting flexible film circuit carrier to an integrated circuit board or card which comprises a contact pin having a stem portion for being joined to the circuit board or card and a head portion having a greater diameter than said stem portion and having three hertz spheres for producing a depression in contact pad of said carrier to provide a force against said contact pad thereon wherein at least the outer surface of said hertz spheres is gold.

4,976,627
GRID/GROUND CONNECTOR

Francis A. O'Loughlin, Scotch Plains, N.J., assignor to Thomas & Betts Corporation, Bridgewater, N.J.

Continuation of Ser. No. 331,978, Mar. 31, 1989, abandoned. This application Mar. 5, 1990, Ser. No. 488,189
Int. Cl.[5] H01R 4/20, 4/66
U.S. Cl. 439—100 10 Claims

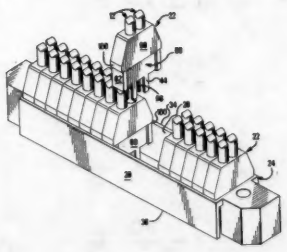


1. An electrical termination device for terminating at least one elongate insulated electrical conductor, said conductor having a connection extent free of said insulation, said device comprising:
a one-piece body formed of electrically conductive material; said body having a central planar member and plural connection legs extending outwardly from and directly attached to said central planar member; and
a first said connection leg including a first conductor engagement portion including in an uncrimped condition a first support wall and a first pair of outwardly extending side walls for supporting therebetween said connection extent, said first support wall being substantially disposed in a plane spaced from and parallel to said plane of said central member and said first pair of side walls extending substantially perpendicular to said plane of said first support wall and to the plane of said central planar member for crimping around said connection extent.

4,976,628
MODULES FOR CABLE ASSEMBLIES

James L. Fedder, Etters, Pa., assignor to AMP Incorporated, Harrisburg, Pa.

Filed Nov. 1, 1989, Ser. No. 430,682
Int. Cl.[5] H01R 4/66
U.S. Cl. 439—101 1 Claim



1. A cable assembly comprising:
a cable containing a plurality of conductors with each conductor containing a signal wire and a ground wire;

a plurality of insulative modules attached to said conductors at each end of said cable, each module having a pair of signal pins disposed in adjacent passages extending through the module and having a tab extending outwardly from one end to which are electrically attached the signal wires of a pair of conductors, said each module further having a ground plate disposed in a recess on one side thereof, said plate being parallel to, spaced from and extending beyond the passages on each side and further having tabs at each corner of one end to which the ground wires of said pair of conductors are electrically attached; and

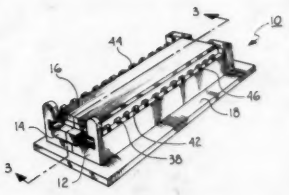
a housing at each end of said cable in which said modules are disposed in side by side relation whereby respective said ground plates are positioned between signal pins in adjacent modules.

4,976,629

ZERO INSERTION FORCE DUAL IN-LINE LCD CONNECTOR

Oskar O. Werner, Leucadia, Calif., assignor to Teledyne Kinetics, Solana Beach, Calif.

Filed Oct. 4, 1989, Ser. No. 417,169
Int. Cl.[5] H01R *13/62*
U.S. Cl. 439—259 **17 Claims**



1. A device for electrically engaging a dual in-line liquid crystal display panel with a printed circuit board which comprises:

a plurality of electrical contacts, each of said contacts having a base and an end point;

a connector body for holding said contacts on said circuit board with said bases in electrical engagement therewith and with said end points distanced from said circuit board in a pair of substantially parallel aligned rows, said connector body being formed with a series of aligned ramps;

an actuator formed with a series of aligned inclines for holding said display panel in a first position between said circuit board and said rows of aligned end points wherein said display panel is distanced from said end points, said actuator being reciprocally moveable on said connector body with said ramps interacting with said inclines for moving said display panel between said first position and a second position wherein said display panel is urged into electrical engagement with said end points of said contacts.

4,976,630

CHIPCARD READER

Bernd Schuder, Schwaigern, and Manfred Reichardt, Weinsberg, both of Fed. Rep. of Germany, assignors to Amphenol Corporation, Wallingford, Conn.

Continuation of Ser. No. 323,998, Mar. 16, 1989, abandoned. This application Jun. 12, 1990, Ser. No. 536,959
Claims priority, application Fed. Rep. of Germany, Mar. 25, 1988, 3810275
Int. Cl.[5] H01R *23/72*; G06K *7/04*
U.S. Cl. 439—260 **26 Claims**

1. A chip card reader apparatus comprising:

a stationary frame with upper and lower surfaces;

an opening in said stationary frame;

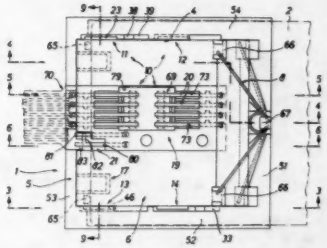
a contact element support comprising means including an integral set of electrical elongate metal contact elements for contacting corresponding contacts on the chipcard;

means for biasing said contact elements against said chipcard; and

guide means for reciprocally mounting said contact element support within said opening for movement between an initial position and a reading position and for positively guiding the contact elements between the initial position and the reading position and vice versa,

said guide means comprising:

a guide element provided on said contact element support;



a first frame guide path provided on said frame, wherein said first frame guide path provides a limitation against movement of said contact element support in an upward direction, said first frame guide path being open in a downward direction and comprising a first flat section adjacent to a ramp surface, and adjacent to the ramp surface a second flat section, said second flat section being located at a higher elevation than said first flat section; and

a second frame guide path provided on said frame, wherein said second frame guide path provides a limitation against movement away from the upper surface, said second frame guide path being open in an upward direction and comprising a first guide surface and a second guide surface with a ramp section in between, said guide surfaces being offset with regard to their elevation.

4,976,631

STATION BAR

Thomas L. Harlow, Jr., 8414 Three Chopt Rd., Richmond, Va. 23229

Filed Oct. 26, 1988, Ser. No. 262,688
Int. Cl.[5] H01R *13/60*
U.S. Cl. 439—535 **11 Claims**

1. A station bar composed of a dielectric first unit adjusted to electrically connect, by pressure contact of an un-insulated portion of each individual conductor to an associated first contact terminal, at least two un-severed multi-conductor electrical cables, said station bar is attached to a framing member of a structure with an appropriate fastening means without the use of a junction box, said station bar comprising:

a hinged dielectric first unit having;

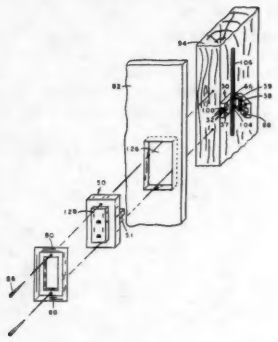
a body including;

at least two electrically conductive first contact terminals being held and kept apart from each other by said dielectric material;

at least a primary group and a secondary group of conductor receiving channels, each individual channel of said groups being lined with a portion of one of said first contact terminals, with each one of said first contact terminals extending from an individual one of said primary group to an associated one of said secondary group, thereby electrically connecting each of said conductors of one of said

cables to an associated one of said conductors of said other cable, when said conductors of said cables are placed in said channels;

a lid including;



an identical number of said groups of said channels as said body; and

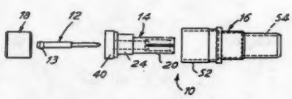
means for attaching said hinged first unit to said framing member of said structure.

4,976,632

DATA BUS CONTACT

Arthur J. Riches, and Derek Andrews, both of Herne Bay, England, assignors to Amphenol Corporation, Wallingford, Conn.

Filed Oct. 12, 1988, Ser. No. 256,860
Int. Cl.[5] H01R *17/18*
U.S. Cl. 439—580 **14 Claims**



1. A triaxial contact assembly comprising an intermediate contact coaxially positioned within an outer contact and an inner contact coaxially positioned within the intermediate contact, the inner and intermediate and intermediate and outer contacts being isolated from one another by means of inner and outer insulators respectively; and retaining means on at least one of said contacts for fixing and axially positioning one of said insulators in respect to said one of said contacts, wherein said one of said contacts and said one of said insulators forms a discrete subassembly of the triaxial contact assembly.

14. A method of assembling a triaxial contact assembly including an intermediate contact within an outer contact and an inner contact within the intermediate contact, the inner and intermediate and intermediate and outer contacts being isolated from one another by means of inner and outer insulators respectively, comprising the steps of:

placing said inner insulator within said intermediate contact;

providing a spacer;

securing said spacer onto said intermediate contact to thereby secure said inner insulator within said intermediate contact;

inserting said inner contact through a bore in said spacer;

inserting wires through respective bores in said inner and intermediate contacts;

securing said outer insulator onto said outer contact;

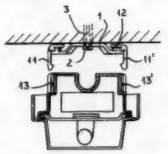
completing assembly by inserting the intermediate contact together with said spacer, said wires, said inner insulator and said inner contact into said secured together outer contact and outer insulator.

4,976,633

IMPROVEMENT IN QUICK END CONNECTION SYSTEMS FOR LAMPS ESPECIALLY LAMP WITH A WEATHERPROOF HOUSING

Gian P. Beghelli, Monteveglio, Italy, assignor to G. P. B. Beghelli S.R.L., Monteveglio, Italy

Filed Jun. 16, 1989, Ser. No. 367,542
Claims priority, application Italy, Jun. 24, 1988, 3520 A/88
Int. Cl.[5] H01R *13/60*
U.S. Cl. 439—571 **3 Claims**



1. A quick end connection system for a lamp, comprising:

a body supporting a watertight box for receiving electrical connectors from the lamp,

a groove around a perimeter of said box having a gasket to provide a seal with the lamp,

at least two spring loaded hooks for engaging and supporting the lamp, and

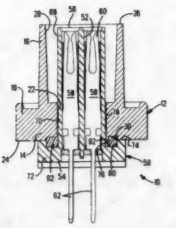
means to attach and connect the body to a ceiling or wall.

4,976,634

MEANS AND METHOD OF SECURING AN INSERT IN A SHELL

Eric T. Green, Hummelstown, and James P. Scholz, New Cumberland, both of Pa., assignors to AMP Incorporated, Harrisburg, Pa.

Filed Aug. 31, 1989, Ser. No. 401,356
Int. Cl.[5] H01R *13/40*
U.S. Cl. 439—589 **12 Claims**



1. A system for sealing an interface between an insert member and a shell member, comprising:

a peripheral channel along and into a shell-facing surface of an insert;

a peripheral recess along and into an insert-facing surface of a shell, said recess corresponding to and opposed from said channel along an interface between said insert and said shell and together defining a seal seat extending partially into surfaces of both said shell and said insert and comprising a substantially completely enclosed region; and

sealant material disposed in said seal seat prior to assembly of said shell and said insert, said sealant material capable of

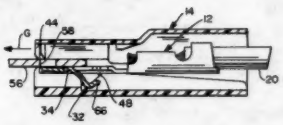
flowing along the surfaces of said seal seat and adhering thereto upon melting and subsequent curing to define a seal between said insert and said shell peripherally around said insert.

4,976,635

LOCKING ELECTRICAL CONNECTOR

Fulvio Gottardo, and Bruno Checchinato, both of Padua, Italy, assignors to Molex Incorporated, Lisle, Ill.

Filed Apr. 9, 1990, Ser. No. 506,124
Int. Cl.[5] H01R 11/22
U.S. Cl. 439—849 20 Claims



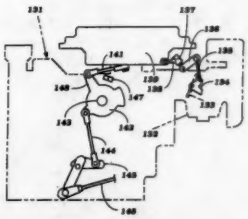
1. In a lockable electrical connector including a receptacle for receiving a plug terminal, the receptacle having a bottom wall, a pair of upstanding side walls terminating in end portions turned inwardly over the bottom wall for engaging the plug terminal, a resilient tongue unitary with the bottom wall, the tongue having means cooperating with the plug terminal for securing the terminal against removal from the receptacle, and the tongue projecting below the bottom wall for exposure to bend the tongue and release the plug terminal, the improvement comprising stop means on the bottom wall of the receptacle in a path of bending movement of the tongue to prevent overstressing the tongue by limiting the amount of bending movement of the tongue.

4,976,636

TRIM APPARATUS FOR MARINE PROPULSION UNIT

Katsumi Torigai, and Masanori Takahashi, both of Hamamatsu, Japan, assignors to Sanshin Kogyo Kabushiki Kaisha, Hamamatsu, Japan

Division of Ser. No. 58,908, Jun. 5, 1987, Pat. No. 4,898,563.
This application Oct. 28, 1988, Ser. No. 263,908
Claims priority, application Japan, Jun. 6, 1986, 61-130045
Int. Cl.[5] B63H 21/26
U.S. Cl. 440—1 7 Claims



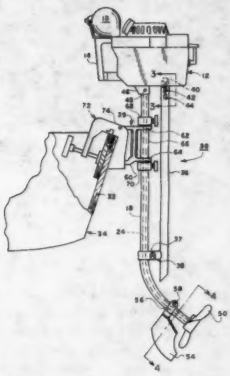
1. In a marine propulsion unit comprising an outboard drive adapted to be supported by a transom of a watercraft for movement between a plurality of trim adjusted positions, power means for moving said outboard drive between said positions, a control operated by an operator to effect a rate of change of speed of said watercraft, and means responsive solely to the operations of said control for operating said power means for adjusting the trim condition of said outboard drive.

4,976,637

OUTBOARD MOTOR CONVERSION KIT

William K. Newell; John A. Newell, and Shawn P. Newell, all of 2N715 Morton Rd., West Chicago, Ill. 60185

Filed Jul. 3, 1989, Ser. No. 375,038
Int. Cl.[5] B63H 21/26
U.S. Cl. 440—49 3 Claims



1. A method of converting a Weedwacker into an outboard motor, said Weedwacker including a first housing, an engine mounted in said first housing, a flexible drive shaft coupled to the output of said engine, a tubular rigid housing having one end thereof affixed to said first housing and enclosing said drive shaft, said tubular housing having a bend therein, a weed cutting device mounted to the other end of said tubular housing and coupled to said drive shaft and a muffler mounted to said engine over the exhaust port thereof; said method comprising the steps of:

rotating said tubular housing through an angle of one-hundred eighty degrees relative to said first housing,

removing said weed cutting device from said other end of said tubular housing and from said flexible shaft,

mounting a propeller assembly including a bearing to said other end of said tubular housing and to said drive shaft with said bearing affixed to said drive shaft,

mounting a swivel mounting bracket to said tubular housing at a location between said bend and said first housing,

removing said muffler from said engine,

attaching one end of an elongated tubular exhaust member to said engine over said exhaust port,

said exhaust member having an open second end located between said bend in said tubular housing and said other end of said tubular housing, and

clamping the section of said tubular housing between said bend and said first housing to said exhaust member,

whereby, said exhaust member extends into the water when said outboard motor is mounted to a boat during use thereof.

4,976,638

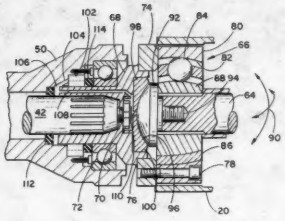
SURFACE DRIVE FOR MARINE CRAFT HAVING INBOARD ENGINE

James E. Grinde, Anoka, Minn., assignor to Yamaha Hatsudoki Kabushiki Kaisha, Iwata, Japan

Filed Apr. 20, 1988, Ser. No. 183,772
Claims priority, application Japan, Apr. 24, 1987, 62-99975
Int. Cl.[5] B63H 5/12
U.S. Cl. 440—57 6 Claims

1. In a surface drive for a marine craft having an inboard engine and a hull including a transom, said surface drive being of the type having a bearing housing attached exteriorly of said

transom and extending rearwardly therefrom, said bearing housing including bearing means for journaling an engine or transmission shaft therein, a propeller shaft extension housing coupled to said bearing housing and extending rearwardly therefrom, a propeller shaft journaled for rotation within said propeller shaft extension housing and a constant velocity universal joint coupled between said engine or transmission shaft and said propeller shaft for transferring rotational forces from



said engine or transmission shaft to said propeller shaft while allowing said propeller shaft extension housing to be pivoted relative to said bearing housing when trimming and steering said marine craft, the improvement comprising:

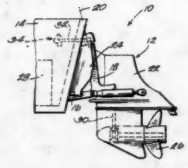
(a) means coupling said engine or transmission shaft to said universal joint for transferring propeller thrust forces directly and colinearly from said propeller shaft to said engine or transmission shaft as said propeller shaft extension housing is pivoted relative to said bearing housing.

4,976,639

POWER STEERING MECHANISM FOR MARINE INSTALLATIONS

David E. Rawlings, Palatine, and Donald K. Sullivan, Prospect Heights, both of Ill., assignors to Outboard Marine Corporation, Waukegan, Ill.

Filed Jul. 28, 1988, Ser. No. 225,260
Int. Cl.[5] B63H *21/26*
U.S. Cl. 440—59 **29 Claims**



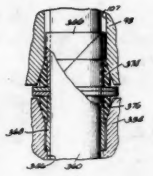
1. A marine installation comprising a propulsion unit adapted to be mounted on a boat for pivotal movement relative thereto about a generally vertical steering axis, said propulsion unit including a rotatably mounted propeller, an engine drivingly connected to said propeller, a valve and cylinder apparatus including a housing having therein a first bore extending along an axis and adapted to communicate with a source of fluid under pressure, a cylinder bore having opposite first and second ends and extending along an axis parallel to said first bore axis, first and second ports communicating with said first bore, a first passageway including a first end communicating with said first port, and a second end communicating with said first end of said cylinder bore, and a second passageway including a first end communicating with said second port, and a second end communicating with said second end of said cylinder bore, a first member slidably housed within said first bore, said first member being movable between a first position wherein said first and second ports are equally pressurized by the source, a second position wherein said first port communicates with the source, and a third position wherein said second port communicates with the source, a second member supported by said housing for movement along a second axis parallel to said first bore axis, and means for moving said first member along said first bore axis in response to movement of said second member along said second axis, a piston slidably housed within said cylinder bore, a piston rod having a first end fixedly connected to said piston, and a second end connected to said propulsion unit for causing pivotal movement of said propulsion unit about said steering axis in response to axial movement of said piston rod, a cable assembly including a sheath fixedly connected to said second member for movement therewith, and an inner core fixedly connected to said second end of said piston rod for movement therewith, and operator actuatable means for causing relative movement of said sheath and said core.

4,976,640

MARINE PROPULSION DEVICE WITH ELASTOMERIC CUSHION

Gerald F. Bland, Glenview; Martin J. Mondek, Wonder Lake, and Lawrence E. Zdanowicz, Waukegan, all of Ill., assignors to Outboard Marine Corporation, Waukegan, Ill.

Filed May 12, 1989, Ser. No. 351,855
Int. Cl.[5] B63H *5/12*
U.S. Cl. 440—61 **11 Claims**



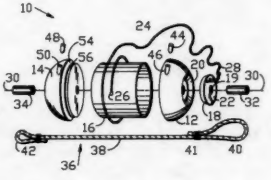
1. A marine propulsion device comprising a member adapted to be mounted on the transom of a boat, a housing which is mounted on said member for pivotal movement relative thereto, one of said member and said housing having therein a first bore, an extendable and contractable hydraulic assembly having a first end connected to the other of said member and said housing and having a second end having therein a second bore, a shaft extending through said first and second bores, bushing means surrounding said shaft in said first and second bores, and elastomeric means surrounding said bushing means in said first and second bores.

4,976,641

BUOY WITH SELF-EJECTING WEIGHT

Dennis D'Amico, 2073 64th Ave. S., St. Petersburg, Fla. 33712

Continuation-in-part of Ser. No. 347,256, May 5, 1989, abandoned. This application Mar. 9, 1990, Ser. No. 491,031
Int. Cl.[5] B63H *22/18*
U.S. Cl. 441—023 **30 Claims**



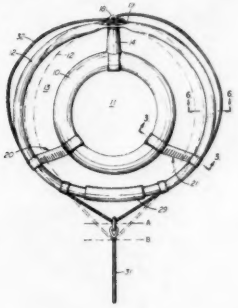
1. A buoy, comprising:

a first buoyant flotation member;

a second buoyant flotation member;

a reel member disposed in sandwiched relation between said first and second flotation members;
means for maintaining said first and second flotation members in sandwiching relation to said reel member;
a nest means formed in a surface of said first flotation member;
a weight member loosely received within said nest means;
an elongate, flexible cord member having a first end secured to said reel member and a second end thereof secured to said weight member;
said cord member being coilable about said reel member;
means for allowing ejection of said weight member out of said nest means when the buoy is tossed into a body of water; and
said means for allowing ejection being the loose fit between said weight member and said nest means;
whereby said weight member is thrown out of said nest means by a bobbing action when said buoy is tossed into a body of water.

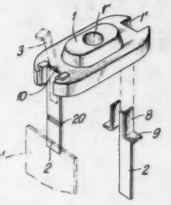
4,976,642
LIFE RING
Lawrence A. Wilkie, 292 Ponderosa Drive, Lake Echo, Halifax County, Halifax County, Nova Scotia, Canada (B0J 2S0)
Filed Sep. 15, 1989, Ser. No. 407,646
Int. Cl.[5] B63C *9/08*
U.S. Cl. 441—131 **14 Claims**



1. A life ring adapted to fit generally about the waist and also to secure the arms of the victim comprising:
a generally rigid inner ring formed of a floatation material, having a continuous approximately circular outer circumference and having a circular central aperture extending therethrough;
a flexible outer ring located externally of the inner ring said flexible outer ring including means for varying the circumference of outer ring to facilitate engagement of the outer and inner rings about the arms of the victim; and
means for adaptably securing the outer ring to said inner ring.

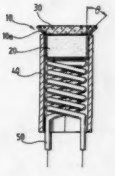
4,976,643
DIRECT-HEATED CATHODE STRUCTURE AND METHOD FOR THE FABRICATION THEREOF
Seung J. Lee, Suwon, Rep. of Korea, assignor to Samsung Electron Devices Co., Ltd., Rep. of Korea
Filed Nov. 2, 1989, Ser. No. 430,729
Int. Cl.[5] H01J *9/04*
U.S. Cl. 313—276 **6 Claims**

1. A cathode capable of being heated directly, comprising:
a ceramic base having spaced slots at the circumference thereof;
supporting bars;
and fixing segments mechanically connecting said supporting bars respectively to said ceramic base, said fixing



elements being respectively inserted into, and bent around, the slots of the ceramic base.

4,976,644
MANUFACTURING METHOD FOR DISPENSER CATHODE FOR AN ELECTRON GUN
Jong-in Jung, Jungja, Rep. of Korea, assignor to Samsung Electron Devices Co., Ltd., Rep. of Korea
Filed Nov. 3, 1989, Ser. No. 431,246
Claims priority, application Rep. of Korea, Nov. 12, 1988, 88-14905
Int. Cl.[5] H01J *9/04*
U.S. Cl. 445—50 **5 Claims**

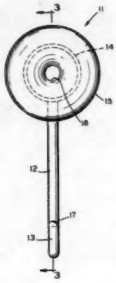


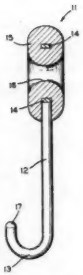
1. A manufacturing method for a dispenser cathode for an electron gun comprising a container, an electron emissive material disposed in the container, and a porous metal body covering the emissive material including melting a metal power in a plasma discharge in an inert gas and spraying the melted metal powder onto the the electron emissive material to form the porous metal body.

4,976,645
BUBBLE FORMING AND BATH SOAP DISPENSING DEVICE
Caren L. Wesson, 8965 N. Fielding Rd., Bayside, Wis. 53217, and Colleen J. Mandell, 2652 Falmouth Rd., Toledo, Ohio 43615
Filed Nov. 14, 1989, Ser. No. 436,376
Int. Cl.[5] A63H *33/28;* **C11D** *17/04*
U.S. Cl. 446—15 **15 Claims**

1. A bubble forming and soap dispensing device comprising:
an elongated shaft having upper and lower ends;
a handle means attached to said lower end of said shaft, said handle means being generally U-shaped; and
a supporting ring attached to said upper end of said shaft and

adapted to be encapsulated by a molded soap material having an aperture formed therein, said handle means





lying in a plane generally orthogonal to a plane in which said ring lies.

4,976,646

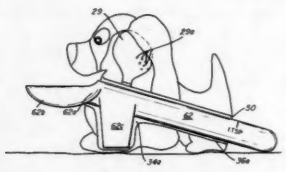
MEDICINE PAL APPARATUS

Vickie D. Hull, 13102 Lookout Mtn. Ct., Houston, Tex. 77069

Filed Oct. 23, 1989, Ser. No. 425,287

Int. Cl.[5] A63H *3/00, 3/52, 3/14;* **B67D** *5/00*

U.S. Cl. 446—74 **22 Claims**



1. A toy for holding a medicine spoon, a medicine cup or a finger, comprising:

a head having an upper jaw;

a body contiguous with said head, said body having front and rear limbs;

said upper jaw and said body defining a longitudinal passageway through which a medicine spoon, a medicine cup, or a finger can be placed to function as a lower jaw of the toy; said front limbs extending down from a front portion of said body being spread apart to form a forward means for loosely engaging a medicine spoon, a medicine cup or a finger thereby forming a bottom open passageway; and

said rear limbs extending down from a rear portion of said body and being spread apart to form a rearward means for firmly engaging around a medicine spoon or a medicine cup.

4,976,647

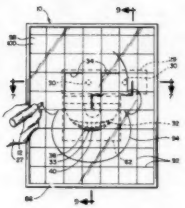
ERASABLE ANIMATED DRAWING BOARD

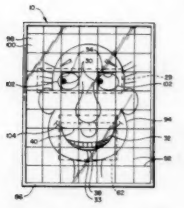
Stephen B. Axtell, 272 Dalton St., Ventura, Calif. 93003

Filed Oct. 1, 1987, Ser. No. 103,429

Int. Cl.[5] A63H *33/00, 33/38;* **G09B** *11/00;* **G09F** *19/08*

U.S. Cl. 446—151 **2 Claims**





1. An animated drawing board comprising in combination:

a front transparent panel formed of synthetic organic plastic having an erasable surface;

an opaque sheet having a pair of horizontally spaced apertures fixedly disposed behind said front panel;

a first horizontally oriented track member mounted behind said first pair of apertures;

a first band slidable received in said first track member having an opaque front surface with preprinted indicia mounted on an area of said front surface of said band;

said opaque sheet having a third aperture comprising a horizontal slit formed therein;

a second vertically oriented track member mounted behind said third aperture;

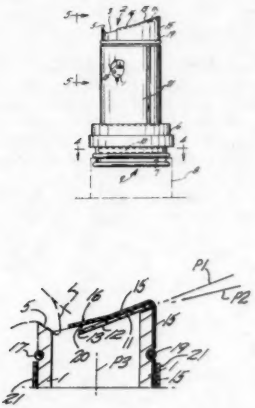
a second band slidably received in said second track member for movement through said third aperture in front of said opaque sheet, said second band having indicia in the form of a mouth formed on the front face thereof;

a back plate supporting said first track member behind said first pair of aperture and said second track member behind said third aperture;

actuating means for moving said first and second bands; and

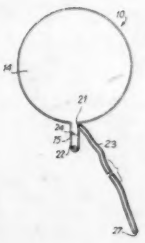
frame means for holding said panel, said opaque sheet, said back plate, and said first and second track members together as a stacked assembly.

4,976,648
ELK CALL
Ralph E. Meline, 880 Sunshine La., Coos Bay, Oreg. 97420
Filed Oct. 16, 1989, Ser. No. 421,946
Int. Cl.[5] A63H 5/00
U.S. Cl. 446—207 16 Claims



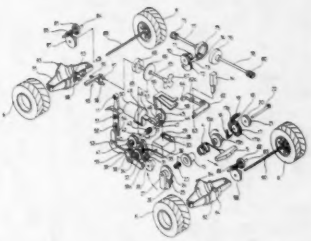
1. An animal call comprising,
an elongate tubular body having a first end and a second end,
a backing plate adjacent said first end and having a tongue with a free edge, and
elastic reed means also on said body in surface contact with the backing plate and having a span in overlying axially spaced relationship to said backing plate tongue, said span having a free edge defining with said first end of the tubular body an air inlet.

4,976,649
DECORATIVE BALLOON STRUCTURE
Neil Mandell, Yardley, Pa., assignor to C. M. Offray & Son, Inc., Chester, N.J.
Filed Jun. 4, 1990, Ser. No. 532,883
Int. Cl.[5] A63H 27/10
U.S. Cl. 446—220 9 Claims



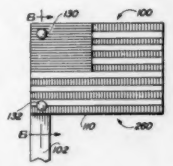
1. In a decorative balloon structure comprising a superposed pair of gas-impervious sheets of heat sealable polymer sealingly connected along a seal line to define a balloon body and an inflation stem extending from said body, the improvement which comprises an integral margin portion of said sheets extending outwardly beyond said seal line and following generally the contours of portions of said seal line surrounding said body, and a weakened tear line formed in said sheets intervening between said seal line and said margin portion, said tear line separating all but an anchor defining end portion of said margin portion from the remainder of said sheets, whereby said margin portion may be separated along said tear line to define a tether connected to said balloon at said anchor portion.

4,976,650
DEVICE FOR STARTING A TOY
Hiroyuki Watanabe, Tokyo, Japan, assignor to Tomy Kogyo Co., Inc., Tokyo, Japan
Filed Oct. 16, 1989, Ser. No. 421,996
Claims priority, application Japan, Dec. 16, 1988, 63-163347
Int. Cl.[5] A63H 5/00, 29/24, 17/34
U.S. Cl. 446—418 9 Claims



1. A device for starting a toy comprising:
input means, operable by a user, for providing a first drive force;
memory means for storing the number of operations of said input means by the user;
sound generating means for producing sounds in response to at least one of said first drive force and a second drive force;
motor means for providing said second drive force in response to at least one of an intermittent input and the number of operations of said input means; and
means for providing said intermittent input based on operation of said input means and on said second drive force.

4,976,651
CLACKER APPARATUS
Barry M. Frank 13610 N. Scottsdale Rd., H10-241, Scottsdale, Ariz. 85254
Filed Dec. 27, 1988, Ser. No. 289,682
Int. Cl.[5] A63H 5/00; G10D 13/08
U.S. Cl. 446—421 20 Claims



1. Clacker apparatus, comprising, in combination:
a base clacker element having first and second sides;
a handle secured to the base clacker element;
outer clacker element means secured to the base clacker element, including at least a single outer clacker element disposed on one of the sides of and adjacent to the base clacker element and movable in a combined movement

while being generally parallel towards and away from the base clacker element and pivoting against and away from the base clacker element, said pivoting for producing a desired sound; and

means for securing the base clacker element and the outer clacker element means together, said means allowing for either generally parallel or pivoting movement of said outer clacker element means relative to said base clacker.

4,976,652

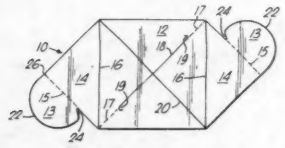
FLAT HANDCRAFT CONSTRUCTION ELEMENT WITH SLOT AND OPPOSED TABS

Idan Schwartz, 76 Zahal St., Petah Tiqwa, Israel

Filed Nov. 9, 1989, Ser. No. 434,922

Int. Cl.[5] A63H *33/00, 3/08, 33/16*; A63F *9/10*

U.S. Cl. 446—488 **9 Claims**



1. A handcraft construction element comprising:

a substantially square central engagement portion defining a diagonal slit therethrough, and

two oppositely disposed triangular integral flaps extending on opposite sides of said engagement portion and separated therefrom by integral hinges, wherein each of said flaps defines an extended tongue adapted to engage said diagonal slit of another such element.

4,976,653

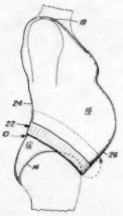
MATERNITY GARMENT WITH TWO-POSITION SUPPORT BAND

Barbara E. White, 208 States St., Apt. #2, San Francisco, Calif. 94114

Filed Mar. 3, 1989, Ser. No. 318,900

Int. Cl.[5] A41B *9/00*; A41D *1/00*

U.S. Cl. 450—155 **3 Claims**



1. A garment adapted to be worn by a person to provide abdominal support during bodily activity, said garment comprising:

an upper body section with front and back portions connected by shoulder straps forming arm holes:

a lower body section connected to the upper body section having front and back portions;

a continuous elastomeric band means extending completely around said lower body section, said back portion of said lower body section having an upper edge that is higher than an upper edge of said front portion so that said upper edge of said back portion is adapted to fit generally across a wearer's lumbar spine region, while said upper edge of said front portion is adapted to fit across the wearer's lower abdominal region, and having continuous opposite edges, and hinge means attached along an edge of said band means and to said upper edge of said lower body section to thereby enable said band means to be moved from a relatively low position on the garment to a relatively high position in order to provide a range of abdominal support to accommodate different wearer sizes and wearer activities.

4,976,654

SELF-PROPELLING HARVESTER THRESHER

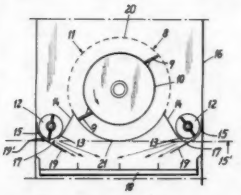
Johannes Dammann; Franz Heidjann, and Heinrich Roderfeld, all of Harsewinkel, Fed. Rep. of Germany, assignors to Claas Ohg, Harsewinkel, Fed. Rep. of Germany

Filed May 5, 1988, Ser. No. 191,892

Claims priority, application Fed. Rep. of Germany, May 23, 1987, 3717501

Int. Cl.[5] A01F *7/06*

U.S. Cl. 460—80 **6 Claims**



1. A self-propelling harvester thresher, comprising a threshing unit; a separating unit located downstream of said threshing unit, said separating unit extending along a traveling direction of the harvester thresher and operating in accordance with the principle of axial flow; and a transporting unit associated with said separating unit and transporting a grain-chaff mixture, said transporting unit being located laterally near said separating unit, said transporting unit and said separating unit having respectively lower limits, said lower limits of said transporting unit and said separating unit being located approximately on a horizontal line extending transversely to the traveling direction of the harvester thresher.

4,976,655

CONNECTING ROD ASSEMBLY FOR DOWNHOLE DRILLING

Edwin D. Hebert, Sr., Broussard, La., assignor to Mud Motors, Inc., Broussard, La.

Filed Aug. 29, 1989, Ser. No. 399,858

Int. Cl.[5] F16D *3/18*

U.S. Cl. 464—16 **5 Claims**

1. A connecting rod assembly for transferring rotational and axial forces between axially misaligned members comprising:

(a) an elongated rigid connecting rod having a lobed male component at each end;

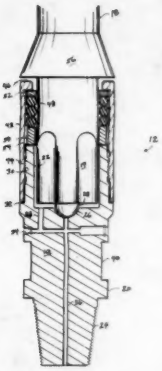
(b) a pair of generally cylindrical female components each having a similarly lobed opening therein, each of said openings being sized to loosely accept its respective said lobed male component, each of said female components also having means for connecting to one of said axially misaligned members;

(c) means for lubricating the connection between said male and said female components, said lubricating means comprising passageways extending radially through said female components;

(d) means for sealing the connection between said male and said female components, said sealing means comprising a

plurality of O-rings positioned around said connecting rod adjacent said male component;

(e) means for protecting the connection between said male and said female components, said protecting means comprising a cylindrical collar secured around a portion of said female component, said collar securing said O-rings around said connecting rod;



(f) means for spacing said male component from said female component, thereby enabling said male and said female components to articulate or become jointed along separate longitudinal axis, said means for spacing comprising:

i. a convex projection secured to the end of each of said male components; and,

ii. a concave depression in said lobed opening of each of said female components, said concave depression being sized to accept said convex projection.

4,976,656

AUTOMOBILE, AND CORRESPONDING HYDROKINETIC COUPLING APPARATUS

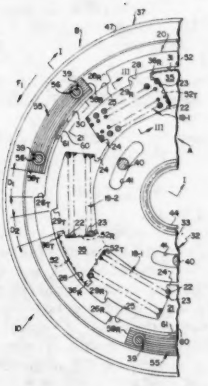
Michel Bacher, Andilly, and Jean E. Bionaz, Fontenay-sous-Bois, both of France, assignors to Valeo, Paris, France

Filed Aug. 30, 1988, Ser. No. 238,045

Claims priority, application France, Sep. 8, 1987, 87 12417

Int. Cl.[5] F16D *3/66*; F16H *45/02*; F16F *15/12*

U.S. Cl. 464—68 **13 Claims**



1. A torsion damping device, of the kind comprising two coaxial parts, mounted for relative rotation against the action of circumferentially acting resilient members, and at least one phasing ring for mounting at least some of said resilient members so as to be operatively in a series relationship with each other, said at least one phasing ring having at least one radially projecting arm circumferentially interposed between two of said resilient means, and retaining means associated with said phasing ring adapted to ensure that said phasing ring is maintained radially with respect to the axis of the assembly, wherein said phasing ring retaining means comprises a plurality of pads, which are separate from each other and circumferentially spaced from each other, each of the said pads being individually secured to one of the said coaxial parts and wherein said pads lie radially on the surface portion of the phasing ring at the outer periphery thereof.

4,976,657

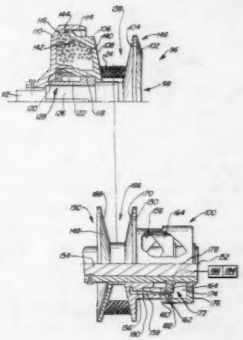
BELT-TYPE STEPLESS SPEED SHIFTING APPARATUS

Hiroshi Takano, Miki, Japan, assignor to Mitsuboshi Belting Ltd., Japan

Filed Jul. 10, 1989, Ser. No. 377,150

Int. Cl.[5] F16H *11/02*

U.S. Cl. 474—13 **24 Claims**



1. A belt-type stepless speed shifting transmission comprising:

an input section having

an input shaft with a rotational axis;

a stationary pulley piece fixedly mounted on said input shaft;

a pulley piece mounted on said input shaft and movable axially relative to said stationary pulley piece,

said stationary and movable pulley pieces cooperatively defining a groove for reception of a belt; and

bearing means for exerting an axial force on said movable pulley piece in the direction of said stationary pulley piece, said axial force increasing with the rotational velocity of the input shaft; and

an output section having

an output shaft with a rotational axis;

a second stationary piece fixedly mounted on said output shaft;

a second pulley piece mounted on said output shaft and movable axially relative to said second stationary pulley piece,

said second stationary and movable pulley pieces cooperatively defining a second groove for reception of a belt;

a stop element carried by said output shaft; and

cooperating cam means on said second movable pulley piece and stop element for effecting relative axial shifting between said second movable and stationary pulley pieces upon said second movable pulley piece being rotated relative to said stop element,

whereby at a predetermined rotational speed of said output shaft, said bearing means exerts an axial force on said movable pulley piece at the input section tending to diminish the width of the belt groove on the input section and with a predetermined load on said output shaft operation of a belt trained about the pulley pieces on the input and output sections causes said second movable pulley piece to rotate relative to said stop element so as to thereby cause the second movable pulley piece to be urged axially relative to the second stationary pulley piece to diminish the width of the second belt groove.

4,976,658

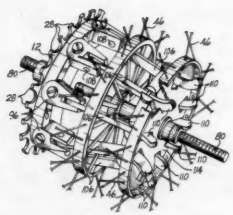
VARIABLE SPEED TRANSMISSIONS

James E. Hood, 10618 Durland Ave., NE., Seattle, Wash. 98125

Filed Nov. 3, 1989, Ser. No. 431,486

Int. Cl.[5] F16H *9/02, 35/02*

U.S. Cl. 474—49 **17 Claims**



1. For use with a driven member which includes a driven member axis, a variable speed transmission, comprising:

a transmission wheel positioned axially adjacent the said driven member and including a transmission wheel axis which extends parallel to said driven member axis;

a positioning yoke for said transmission wheel positioned adjacent the transmission wheel;

means supporting the transmission wheel on said positioning yoke for rotation about said transmission wheel axis relative to the positioning yoke;

means supporting and guiding said positioning yoke for translation in a yoke plane which is perpendicular to the driven member axis, for varying the distance between the driven member axis and the transmission wheel axis; and

adjustable length drive spokes drivingly connecting the transmission wheel to said driven member;

wherein in use the positioning yoke is positioned to establish a desired amount of offset of the transmission wheel axis from the driven member axis, and a driving force is imposed on the transmission wheel to in that manner rotate the transmission wheel about the transmission wheel axis, and the rotation of the transmission wheel rotates the drive spokes and the drive spokes transmit the rotation of the transmission wheel to the driven member, causing the driven member to rotate about the driven member axis.

4,976,659

SLIDE RAIL FOR TIGHTENING A TRANSMISSION

Rüdiger Hans, Niederwerrn, and Otmar Winkler, Schweinfurt, both of Fed. Rep. of Germany, assignors to SKF GmbH, Schweinfurt, Fed. Rep. of Germany

Filed Feb. 28, 1989, Ser. No. 317,008

Claims priority, application Fed. Rep. of Germany, Mar. 25, 1988, 3810188

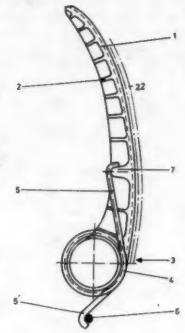
Int. Cl.[5] F16H *7/08*

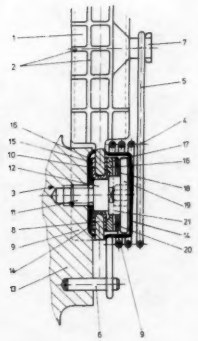
U.S. Cl. 474—111 **25 Claims**

1. A slide rail assembly for tightening a transmission connecting two drive wheels comprising:

a slide rail;

a pivot bearing located near one end of the slide rail, said





pivot bearing comprising a frictional damper, said frictional damper capable of pivoting; and

a spring producing pressure against the slide rail.

4,976,660

APPARATUS FOR TENSIONING V-BELTS, ESPECIALLY FOR AUTOMOTIVE VEHICLES

Werner Breindl, Unterschleissheim, Fed. Rep. of Germany, assignor to Ina Walzlager Schaeffler KG, Herzogenaurach, Fed. Rep. of Germany

PCT No. PCT/EP88/00696, § 371 Date May 30, 1989, § 102(e) Date May 30, 1989, PCT Pub. No. WO89/01098, PCT Pub. Date Feb. 9, 1989

PCT Filed Aug. 1, 1988, Ser. No. 346,943

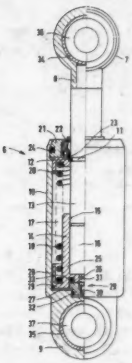
Claims priority, application Fed. Rep. of Germany, Jul. 31, 1987, 8710548[U]

Int. Cl.[5] F16H *7/12*

U.S. Cl. 474—135 **5 Claims**

1. Apparatus for tensioning V-belts, especially for automotive vehicles, comprising a link member (6) of variable length which engages a movable support (4) of a pulley (3) and is supported by a stationary abutment, said link member comprising a casing (10) carrying a connection bearing (9), a piston rod, (8) guided within the casing and carrying a further connection bearing (7), and a helical compression spring (18) anchored between a spring rest (19) of the casing and a spring rest (20) of the piston rod, characterized in that, with reference to the operative position, there extends from the bottom of the casing (10) a cylinder (14) with a clearance (15) that permits a

leakage flow of pressurized liquid, said cylinder defining a pressurized liquid-filled cylinder space (16) communicated on the one hand with a casing interior (17) between the piston rod or the cylinder comprising the same, respectively, and being



communicated on the other hand with the casing surface of the casing via a system of passageways (26, 27, 28) which includes a spring-biased check valve (29) for blocking the flow of pressurized liquid from the cylinder space (16).

4,976,661

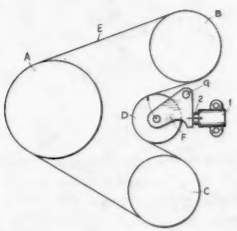
BELT OR CHAIN TENSIONER FOR POWER TRANSMITTING SYSTEM

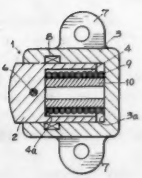
Juji Ojima, Aikawa, Japan, assignor to NHK Spring Co., Ltd., Yokohama, Japan

Filed Aug. 21, 1989, Ser. No. 396,029

Int. Cl.[5] F16H 7/12

U.S. Cl. 474—138 **8 Claims**





1. In a spring tensioner device for applying tensioning pressure to an endless drive element, such as a belt or chain, the device comprising a piston and cylinder assembly which includes a coil spring within the cylinder for applying outward pressure on the piston, the improvement wherein the spring has a load to deflection curve with a deflection point between two adjacent regions of the curve at which point the curve changes direction and wherein the assembly is configured for setting the spring at a position wherein said deflection point is within an operating range of the device.

4,976,662

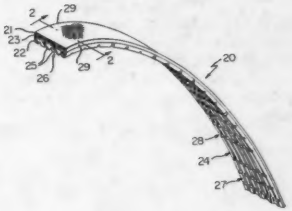
ENDLESS POWER TRANSMISSION BELT CONSTRUCTION AND METHOD OF MAKING THE SAME

Joseph P. Miranti, Jr., Nixa, Mo., assignor to Dayco Products, Inc., Dayton, Ohio

Division of Ser. No. 410,165, Sep. 20, 1989, Pat. No. 4,938,736, which is a division of Ser. No. 324,852, Mar. 17, 1989, Pat. No. 4,884,998, which is a division of Ser. No. 152,693, Feb. 5, 1988, Pat. No. 4,832,670. This application Apr. 24, 1990, Ser. No. 513,694

Int. Cl.[5] F16G 1/28

U.S. Cl. 474—205 **11 Claims**



1. In a method of making an endless power transmission belt construction having opposed side edge means and having an inner surface means defining a plurality of longitudinally disposed and alternately spaced apart projections and grooves for meshing with a ribbed surface means of a rotatable pulley means or the like and defining a plurality of transversely disposed and alternately spaced apart projections and grooves that respectively extend between and to said opposed side edge means, the improvement comprising the step of forming the longitudinal spacings between said transverse grooves to be staggered so as to tend to reduce noise during normal operation of said belt construction with said pulley means or the like, the step of forming causing said longitudinal spacings to comprise different lengths that are arranged in a random sequence of a certain number of said lengths with that sequence then being repeated throughout the length of said belt construction in the longitudinal direction thereof, the step of forming comprising the step of first forming said transversely disposed and alternately spaced apart projections and grooves in a surface means of a belt sleeve and then the step of forming said longitudinally disposed and alternately spaced apart projections and grooves in said surface means of said belt sleeve.

4,976,663

DRIVING BELT, ELEMENT FOR SUCH DRIVING BELT AS WELL AS A METHOD FOR PRODUCING SUCH ELEMENT

Johannes Hendrikus, Berlicum, Netherlands, assignor to Van Doorne's Transmissie B.V., Tilburg, Netherlands

Filed Sep. 27, 1989, Ser. No. 413,359

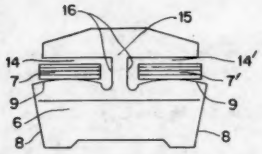
Claims priority, application Netherlands, Oct. 17, 1988, 8802546

Int. Cl.[5] F16G 1/24

U.S. Cl. 474—242 **19 Claims**

1. Transverse element for a driving belt, suitable for being used on V-shaped pulleys of a continuously variable transmission, said driving belt being provided with one or more endless carriers on which the transverse elements are movably provided, whereby the transverse elements are provided with one or more recesses for accommodating the carriers, and whereby

each recess is bounded by at least one abutting face for butting against the inner side of the carrier, as well as by at least one



boundary face for laterally retaining the carrier, characterized in that the lateral boundary face is at least partly rounded in the longitudinal direction of the transverse element.

4,976,664

VEHICLE DRIVE TRANSMISSION HAVING A HIGH POWER RATIO

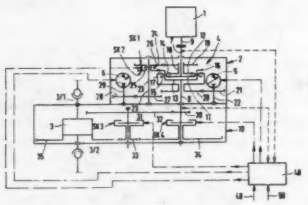
Faust Hagin, and Hans Drewitz, both of Hünchen, Fed. Rep. of Germany, assignors to Man Nutzfahrzeuge Aktiengesellschaft of Munchen, Fed. Rep. of Germany

Filed Jul. 5, 1989, Ser. No. 375,601

Claims priority, application Fed. Rep. of Germany, Jul. 27, 1988, 3825409

Int. Cl.[5] F16H *47/04*

U.S. Cl. 475—80 **5 Claims**



1. A drive device for a vehicle comprising:

a drive prime mover,

a power splitting hydrostatic-mechanical transmission coupled with said prime mover and comprising a planetary differential transmission including four shafts, two groups of planet wheels, two sun wheels, a web and an annulus,

two main shafts constituting two of said four shafts of the planetary differential transmission, said two main shafts forming an input and output of said transmission,

a differential connected to drive front and rear axle drive trains of the vehicle,

clutch means,

two variable displacement hydrostatic machines respectively connected in at least one operational range with said planetary differential transmission and adapted to alternately operate as a pump and as a motor, a first one of said hydrostatic machines which, when the second hydrostatic machine is stationary, being able to be switched over from the input main shaft to one of the sun wheels on transition from a first operational range to a second operational range by said clutch means and during traction operation being switched over from the motor to the pump function, wherein said drive device further comprises:

an additional mechanical transmission connected to the output main shaft of said power splitting transmission and including gearing and two clutches for operation in two transmission ratios, and a controller which on switching from one of the said transmission ratios to the other causes actuation of said two clutches as well as a sudden opposite modification of displacement controlling angles of said first and second hydrostatic machines to cause the displacement of the second hydrostatic machine to be increased to a maximum while the displacement of said first hydrostatic machine decreases to zero, said additional transmission comprising:

a first gear wheel keyed on the output main shaft of the power splitting transmission,

a second gear wheel coupled by one of said two clutches with the output main shaft of the power splitting transmission,

a third gear wheel in mesh with the first gear wheel and keyed on an intermediate shaft,

a fourth gear wheel able to be connected by the other of said two clutches with the intermediate shaft,

and a fifth gear wheel in mesh with said fourth gear wheel and drivingly connected with said differential.

4,976,665

VEHICLE DRIVE DEVICE WITH A HYDROSTATIC-MECHANICAL POWER SPLITTING TRANSMISSION

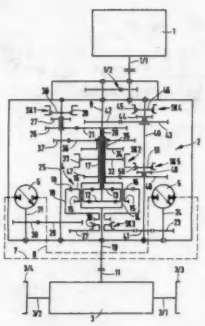
Faust Hagin, Munich, and Helmut Flenker, Zorneding, both of Fed. Rep. of Germany, assignors to Man Nutzfahrzeuge AG, Munich, Fed. Rep. of Germany

Filed Jun. 15, 1989, Ser. No. 366,734

Claims priority, application Fed. Rep. of Germany, Jun. 24, 1988, 3821290

Int. Cl.[5] F16H *47/04*

U.S. Cl. 475—80 **17 Claims**



1. A vehicle drive device comprising a hydrostatic mechanical power transmission between a prime mover and a driven mechanism, said power transmission comprising:

an input shaft drivingly coupled to the prime mover,

an output shaft drivingly coupled to the driven mechanism,

a planetary differential transmission connecting said input shaft and said output shaft for drive in three operational ranges, in which in the first operational range the ratio of the rotational speed of the output to the input shafts is less than about 0.5, in the second operational range the speed ratio is between about 0.5 and 0.8 and in the third operational range said speed ratio is greater than about 0.8,

said planetary differential transmission comprising first and second sun wheels, the first sun wheel being fast with the input shaft,

first and second groups of planet wheels respectively in mesh with said first and second sun wheels,

two further drive shafts, one of which is connected to said second sun wheel,

a web connected to said output shaft and to the other of said further drive shafts, and

an radially annulus supporting said planet wheels,

first and second hydrostatic machines, each operable as a pump and a motor and hydraulically connected so that

when one machine operates as a pump it drives the other as a motor and vice-versa, said first and second hydrostatic machines having respective power shafts, first and second supplementary shafts drivingly coupled to respective power shafts of said first and second hydrostatic machines,

gear trains on each supplementary shaft, and clutch means for selective connecting said gear trains to said annulus, said web and said input shaft and said further drive shafts to provide transition between said operational ranges, and upon transition to said third operational range to disconnect at sync speed the first hydrostatic machine from a drive connection with the differential transmission via said annulus and respective power shaft and provide a drive connection selectively with one of said input and output shafts to the differential transmission.

4,976,666

CONTINUOUS SPEED-CHANGE BRANCHED GEAR, IN PARTICULAR FOR MOTOR VEHICLES

Michael Meyerle, Kieferaweg 9, D-7996 Meckenbeuren-Lochbrucke, Fed. Rep. of Germany

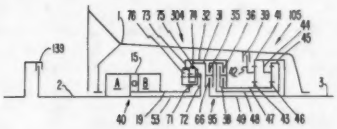
PCT No. PCT/DE87/00157, § 371 Date Feb. 9, 1988, § 102(e) Date Feb. 9, 1988, PCT Pub. No. WO87/06316, PCT Pub. Date Oct. 22, 1987

PCT Filed Apr. 8, 1987, Ser. No. 154,351

Claims priority, application Fed. Rep. of Germany, Apr. 10, 1986, 3612037; Mar. 20, 1987, 3709191

Int. Cl.[5] F16H *47/04*

U.S. Cl. 475—83 **20 Claims**



1. A continuously variable split-path transmission having at least three forward operating ranges an including a stepless, wrap-around mechanical converter comprising a primary unit and a secondary unit, a four-shaft summation planetary gear train for adding up the power which is split from the input shaft of the transmission into multiple power transmission paths, and a downstream second planetary gear unit, wherein the input shaft is in permanent driving connection with the primary unit and with a first shaft of the summation planetary gear train and a second shaft in permanent connection with the secondary unit, and wherein third and fourth shafts of the summation planetary gear unit are selectively connetable with the second planetary gear unit.

4,976,667

DIFFERENTIAL CLUTCH AND LEVER ACTUATION SYSTEM THEREFOR

Edward J. Goscenski, Jr., Battle Creek, Mich., assignor to Eaton Corporation, Cleveland, Ohio

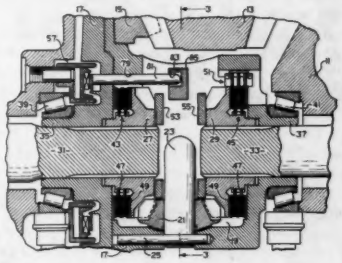
Continuation-in-part of Ser. No. 154,395, Feb. 10, 1988. This application Dec. 12, 1988, Ser. No. 282,716

Int. Cl.[5] F16H *1/44*

U.S. Cl. 475—86 **27 Claims**

1. A differential gear mechanism of the type including a gear case defining a gear chamber and an axis of rotation; at least one pinion gear, and a pair of bevel side gears in meshing engagement with said pinion gear; clutch means operable between a relatively disengaged condition and a relatively engaged condition, and effective to retard relative rotation between said gear case and each of said side gears, said clutch means comprising at least a pair of clutching surfaces disposed to be engaged in response to axial movement of one of said side gears toward the adjacent surface of said gear case; and actuating means for actuating said clutch means, said actuating means comprising a fluid pressure actuated displacement mechanism operable to achieve an output displacement in response to an external fluid pressure input signal, characterized by:

(a) said actuating means including input means operable in response to said output displacement of said displacement mechanism to provide an axial input having an actuating travel X and an actuating force F;



(b) said actuating means further including fulcrum means, and lever means operatively associated with said fulcrum means and with said input means to transmit said axial input into clutch actuating movement of said one of said side gears; and

(c) said fulcrum means and lever means being configured such that said clutch actuating movement of said one side gear has an actuating travel substantially less than said actuating travel X, and an actuating force substantially greater than said actuating force F.

4,976,668

FINAL REDUCTION GEAR UNIT FOR AN AUTOMOBILE

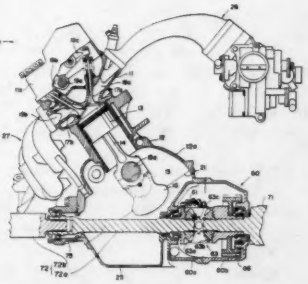
Noboru Ashikawa, and Toshiyuki Yumoto, both of Saitama, Japan, assignors to Honda Giken Kogyo Kabushiki Kaisha, Tokyo, Japan

Filed Dec. 9, 1988, Ser. No. 282,635

Claims priority, application Japan, Dec. 11, 1987, 62-313826

Int. Cl.[5] F16H *37/08, 57/02*

U.S. Cl. 475—221 **5 Claims**



1. A final reduction gear unit for an automobile, comprising:

an orthogonal converter gear train including a first rotatable input shaft adapted to extend in a longitudinal direction of the automobile, a drive bevel gear coupled to said first rotatable shaft for rotation about an axis thereof, a second rotatable shaft lying perpendicularly to said first rotatable shaft and adapted to extend in a transverse direction of the

automobile, and a driven bevel gear mounted on said second rotatable shaft for rotation about an axis thereof;

a speed reducer gear train including a drive cylindrical gear mounted on said second rotatable shaft for rotation with said driven bevel gear, and a driven cylindrical gear held in mesh with said drive cylindrical gear and rotatable about an axle axis;

a differential gear train combined with said driven cylindrical gear for distributing power, from an engine of the automobile transmitted to said driven cylindrical gear, to road wheels of the automobile; and

first and second axle shafts for transmitting power from said differential gear train to the road wheels, one of said axle shafts extending through a case of said engine, said axle shafts positioned along said axle axis parallel to and laterally offset from said second rotatable shaft,

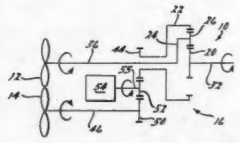
wherein said engine includes (a) a crankshaft extending in the longitudinal direction of the automobile, said orthogonal converter gear train, said speed reducer gear train, and said differential gear train being disposed integrally on one side of said engine and (b) cylinder axes inclined from the vertical in the transverse direction of the automobile, said orthogonal converter gear train, said speed reducer gear train, and said differential gear train being disposed on the side of the engine which faces away from the direction in which said cylinder axes are inclined.

4,976,669

DUAL OUTPUT PLANETARY GEAR SYSTEM

John F. Jones, Berkley, Mich., assignor to Williams International Corporation, Walled Lake, Mich.

Filed Jul. 20, 1989, Ser. No. 382,314
Int. Cl.[5] F16H *37/06*
U.S. Cl. 475—248 **5 Claims**



1. A gear system for driving a first and second rotor with a rotary input, said rotors being of like dimension and operating in a common medium, said gear system comprising:

a planetary gear train coaxially comprising a sun gear, an annulus gear, and a planetary gear carrier having at least one planetary gear mounted thereon, the planetary gear meshing simultaneously with the sun gear and the annulus gear;

means for driving the sun gear with said rotary input;

first means for coupling the carrier to said first rotor, said first coupling means including a first output shaft located coaxially with the carrier of said planetary gear train and attached thereto; and

second means for coupling the annulus gear to said second rotor, said second coupling means including

an annular sleeve located concentrically about said first output shaft and attached to said annulus gear;

a pinion gear mounted on said annular sleeve;

a second output shaft located substantially parallel to said first output shaft;

an output gear mounted on said second output shaft; and

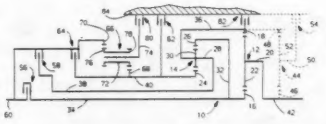
an idler gear meshing simultaneously with said pinion gear and said output gear, respectively.

4,976,670

POWER TRANSMISSION

Donald Klemen, Carmel, Ind., assignor to General Motors Corporation, Detroit, Mich.

Filed Jun. 2, 1989, Ser. No. 360,675
Int. Cl.[5] F16H *57/10*
U.S. Cl. 475—278 **5 Claims**



1. A power transmission providing a plurality of forward drive ratios and a reverse drive ratio comprising input means for delivering power; first, second and third selectively engageable clutch means operatively connected with said input means for receiving power therefrom; output means for delivering power from said transmission; first planetary gear means for selectively establishing drive ratios within the transmission including a first member connected to the first of said clutches, a second member connected to said output means, and a third member; second planetary gear means for selectively establishing drive ratios within said transmission including a first member connected to the second of said clutches, a second member connected to the first member of said first planetary gear means and a third member connected with the third of said clutch means and with the third member of said first planetary gear means; reverse gear means for selectively providing a negative ratio between said input means and the first member of said second planetary gear means and including a first gear member drivingly connected with said input means, a second gear member drivingly connected with said first member of said second planetary gear means and selectively engageable reverse clutch means for connecting said reverse gear means with said input means to establish the negative ratio input drive to said second planetary gear means; and first and second selectively engageable brake means cooperating with said first and second planetary gear means, said reverse gear means and said first, second and third clutch means and selectively with said reverse clutch means to establish at least two of said plurality of forward drive ratios, the at least two ratios including a lowest gear ratio.

4,976,671

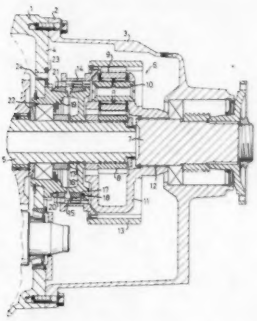
RANGE GEARBOX FOR MOTOR VEHICLES

Sven Andersson, Floda, Sweden, assignor to AB Volvo, Gothenburg, Sweden

Filed Jun. 7, 1983, Ser. No. 501,905
Claims priority, application Sweden, Jun. 7, 1982, 8203512
Int. Cl.[5] F16H *3/44*
U.S. Cl. 475—299 **1 Claim**

1. Vehicle transmission, especially for heavy trucks, comprising a base gearbox and a two-mode range gearbox of planetary gear type, both gearboxes having housings that are secured to each other and the base gearbox having an end wall facing the range gearbox, the base gearbox having a driven shaft that emerges from said end wall and serves as an input shaft of said range gearbox, said range gearbox having an output shaft, said input shaft carrying a sun gear which engages planet gears, which are carried by a planet gear carrier joined to said output shaft of the range gearbox and which engages an annulus, which can be locked by shift means either against rotation relative to said housings to establish reduction ratio drive between said shafts or against rotation relative to the shafts to establish direct drive between the shafts, characterized in that the annulus is rigidly joined to a shifting sleeve serving an an annulus carrier and arranged concentric with said input shaft, said shifting sleeve being axially displaceable

between a first shift position in which it establishes a non-rotational coupling between the annulus and the said input shaft,



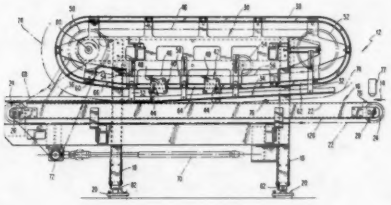
and a second shift position in which it fixes the annulus to said base gearbox end wall facing the range gearbox.

4,976,672

SQUARING FOLDED CONTAINER BLANKS

John R. Harrison, and John R. Van Noy, both of Baltimore, Md., assignors to The Ward Machinery Company, Cockeysville, Md.

Filed Mar. 3, 1989, Ser. No. 319,429
Int. Cl.[5] B31B *1/62*
U.S. Cl. 493—130 **21 Claims**



20. A method of squaring folded container blanks, comprising the steps of:

partially folding container blanks to create partially folded blanks each having two overlapping flaps defining at least one slot therebetween;

introducing a gauge plate in the slot of each respective blank before folding thereof has been completed;

completing folding of said partially folded blanks;

leaving the gauge plate inserted in the respective slot during completion of folding of the respective blank to effect squaring of the respective folded blank; and then

withdrawing the gauge plate from the respective slot.

4,976,673

APPARATUS AND METHOD FOR THE PRODUCTION OF FLEXIBLE BAGS

David A. Smith, Midland; Albert C. Dowell, Mt. Pleasant, and Herbert B. Gieger, Bay City, all of Mich., assignors to Dow Brands Inc., Indianapolis, Ind.

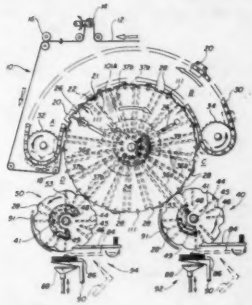
Filed Sep. 22, 1989, Ser. No. 411,423
Int. Cl.[5] B31B *23/16, 23/64*
U.S. Cl. 493—194 **62 Claims**

1. An apparatus for the continuous production of individual flexible products from a folded web of material comprising:

a rotatable product drum having a plurality of sever and seal stations located about the periphery thereof for forming individual products;

a source of continuous folded web of materials;

means for continuously feeding said folded web of material onto the surface of said drum; and



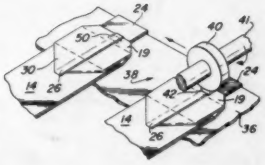
compressible means for tucking said web of material outwardly from the periphery of said drum, said compressible means for tucking being positioned between adjacent sever and seal stations.

4,976,674

BAG AND METHOD OF MAKING THE SAME

Gilbert N. Yannuzzi, Jr., Richboro, Pa., and Jeffrey D. Muhs, Sun Prairie, Wis., assignors to American Packaging Corporation, Philadelphia, Pa.

Filed Mar. 6, 1990, Ser. No. 489,455
Int. Cl.[5] B31B *1/64, 49/04*
U.S. Cl. 493—195 **3 Claims**



1. A method of making a bag of the gusseted squarebottom type comprising the steps of:

forming a tube having an outer sheet and an inner liner of an imperivous material, with said liner being adhered to the outer sheet at the mating surfaces thereof,

forming a pair of spaced-apart parallel slits in one of said tube walls extending inwardly from an edge to define a tab portion,

forming the bottom end of the bag into a diamond fold with the tab portion at one end thereof and a triangular portion at the other end thereof,

applying pressure seals to the diamond fold to completely seal the bottom end of the bag,

said sealing step including a first sealing step wherein the diamond fold is heat and pressure sealed along the apex thereof to form a fin seal, a second sealing step wherein the diamond fold is heat and pressure sealed along an area adjacent said tab portion and extending transversely to said fin seal to form a cross seal intersecting with said fin seal, and a third sealing step wherein a pressure seal is applied across a substantial area at the intersection of said fin seal and said cross seal to provide a strong seal at this location to prevent leakage thereat,

and completing the bag bottom by folding over the triangu-

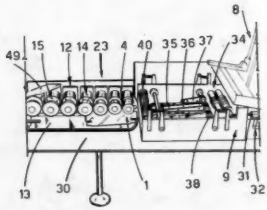
lar portion and said tab portion and adhere the same together to complete the formation of the bottom of the bag.

4,976,675

AUTOMATIC MACHINE FOR FOLDING FLAT PRE-CREASED DIE-CUTS INTO TUBULAR SHAPE

Gianni Bosi, Zola Predosa, Italy, assignor to Verpac, S.p.A., Italy

Filed Sep. 26, 1989, Ser. No. 412,442
Claims priority, application Italy, Sep. 30, 1988, 3609 A/88
Int. Cl.[5] B31B *3/06, 3/26, 3/62*
U.S. Cl. 493—295 **15 Claims**



1. An automatic machine for folding flat die-cuts into tubular shape, utilizing die-cuts pre-creased at least with parallel longitudinal fold lines providing division into at least five contiguous and parallel panels of which one functions as a securing flap, comprising:

a magazine into which and from which die-cuts are stacked and dispensed, respectively;

means by which the die-cuts are picked up from the bottom of the magazine;

a revolving head provided with a plurality of radial grippers designed to engage at least the panels of the die-cut lying immediately on either side of the central panel;

means located between the pick-up means and the revolving head, by which die-cuts received from the pick-up means with the securing flap positioned so as to lead, considered in relation to the direction of rotation of the revolving head, are bent into a U-shape by rotation of the outer panels in relation to the central panel, comprising positive conveyor means by which the die-cuts are engaged through contact with the central panel and conveyed positively in a given plane, operating in conjunction with helically shaped guiding and folding elements located one on either side of the conveyor means and embodied as channels lying in the same plane as that occupied by the die-cuts at the end nearest the pick-up means and in planes perpendicular thereto at the end nearest the revolving head, in such a manner as to engage at least the panels contiguous to the central panel and bend them at right angles to the central panel as the die-cut progresses along the conveyor means;

first and second folding means located along the circumference of the revolving head, by which the outermost panel constituting the securing flap is folded in first over the space encompassed by the 'U', and the remaining outermost panel then folded over and onto the securing flap;

means for applying glue located between the first and second folding means and serving to dispense adhesive onto the outward facing surface of the folded securing flap;

elevator means positioned in longitudinal alignment with the conveyor means, serving to place the U-shaped die-cuts between the jaws of relative grippers carried by the revolving head, and capable of movement between a lowered position in which no obstruction is offered to the die-cut proceeding along the conveyor means, and a raised position between the jaws of one of the grippers;

suction means associated with each radial gripper, located along the outer edges parallel to the axis of rotation of the revolving head and connected by way of a valve to a source of negative pressure, designed both to engage the die-cut by way of the panels contiguous to the central panel at points along and in close proximity to the creased fold lines that separate them from the outer panels, and to provide support means for the first and second folding means and the glue applicator means;

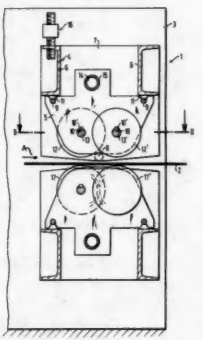
on/off means located between the suction means and the valve, which serve to isolate the gripper from negative pressure at least in the event that the hold on a die-cut is wholly or partly unsuccessful.

4,976,676

LONGITUDINAL SLITTING AND/OR GROOVING MACHINE FOR TRANSPORTED MATERIAL SHEETS, PARTICULARLY FOR SHEETS OF CORRUGATED BOARD

Hermann Mensing, Weiherhammer; Reinhard Sternitzke, Kaltenbrunn; Karl Waldeck, Etzenricht, and Klaus Schnabel, Grafenwöhr, all of Fed. Rep. of Germany, assignors to BHS-Bayerische Berg-, Hutten- und Salzwerke Aktiengesellschaft, Fed. Rep. of Germany

Filed Aug. 4, 1989, Ser. No. 389,500
Claims priority, application Fed. Rep. of Germany, Aug. 9, 1988, 3826993
Int. Cl.[5] B31F *1/00*
U.S. Cl. 493—365 **14 Claims**



1. An apparatus for longitudinally slitting and grooving material sheets, particularly for sheets of corrugated board, comprising guide beds tiltably supported in a framework of the apparatus and positioned laterally with respect to the direction of travel of the sheet through the apparatus above and below the sheet, the guide beds being disposed parallel to and spaced from one another, said guide beds including tool body members adjustably held in said guide beds by adjusting spindles and couplings, and a plurality of tool members mounted on each tool body member which are selectively engageable with the sheet so that, upon tilting of said guide beds, designated upper and lower tool members cooperate in pairs and are rotatably driven to longitudinally slit and groove the material sheets.

4,976,677

PROCESS FOR THE PRODUCTION OF FILTERS, AND A FILTER PRODUCED BY THE PROCESS

Per-Erik Siversson, Munkedal, Sweden, assignor to Flodins Filter AB, Lysekil, Sweden

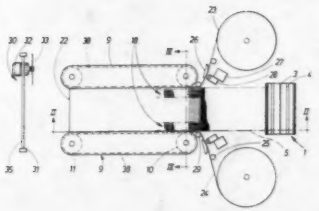
PCT No. PCT/SE87/00532, § 371 Date Jun. 21, 1989, § 102(e) Date Jun. 21, 1989, PCT Pub. No. WO88/03833, PCT Pub. Date Jun. 2, 1988

PCT Filed Nov. 12, 1987, Ser. No. 377,838

Claims priority, application Sweden, Nov. 17, 1986, 8604893

Int. Cl.[5] B01D *27/06*; B05B *1/14*

U.S. Cl. 493—413 3 Claims



1. A process for the production of a filter having an active filtering part made up of a folded filter material web, said web being delimited by side edges at which the folds terminate, and end edges at which a first or last fold is located, comprising the steps of: first producing a blank by creasing the filter material web and pushing the same together to form the folds with formation of predetermined spacings between the folds during advancement of the folded web; joining said side edges of the web by strips, such that the ends of the folds are covered over and fixed by the strips; cutting off the blank which comprises the folded material web and the strips arranged on its side edges, to form filter units; maintaining the spacings between the folds constant on application of the strips and during advancement by means of threads of at least one screw element pushing down between the folds, said threads thus form spacing elements; rotating the at least one screw element, such that the threads follow the folds during the advancement; and assembling several filter units in a casing to form a filter having a filter surface which corresponds to the combined surface of the units included, said casing having a box shape with a first side and a second side corresponding thereto, openings in each side, the filter units being arranged sealingly between said sides so that between said units spaces are formed which extend between the said first and second sides; each filter unit partly bordering on a space which is in communication with the openings on the first side and, at its second side, on a space which is in communication with the openings on the second side, so that a medium, which flows in through the openings on one side and out through the openings on the other side, must pass at least one wall formed by the filter material web of at least one of the filter units.

4,976,678

CENTRIFUGAL SEPARATOR

Yutaka Suginaka, and Shigeru Taniguchi, both of Odawara, Japan, assignors to Meiji Milk Products Co., Ltd., Tokyo, Japan

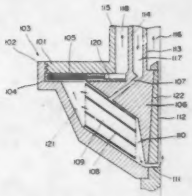
Filed May 31, 1989, Ser. No. 359,080

Claims priority, application Japan, Jun. 7, 1988, 63-138447

Int. Cl.[5] B04B *1/00, 1/08, 11/00*

U.S. Cl. 494—68 8 Claims

1. A centrifugal separator which includes a rotor (103) composed of a drum, a drum cover, an inner wall face (121), a plurality of particle collecting chambers defined by a plurality of members which extend radially inwardly from a maximum diameter portion of said inner wall face of said rotor toward an axis of said rotor, and means for continuously extracting particles as concentrate from said collecting chambers by moving the concentrate toward said axis, in which each of said collecting chambers (104:104*a*) is an annular, circumferentially extending space; in which the boundary of said collecting chambers is defined at least in part by said inner wall face of said rotor; in which said inner wall face has a sharp transition at an axial location adjacent to the axial location of said maximum



diameter portion; in which the diameter of the inner wall face increases continuously and gradually toward the axial location of said transition from the location of a smaller diameter portion of said inner wall face spaced axially from said transition; and in which the diameter of said inner wall face increases rapidly from said transition to said maximum diameter portion.

4,976,679

PROCESS FOR PRODUCING A URETHANE AND A CARBONIC ACID ESTER

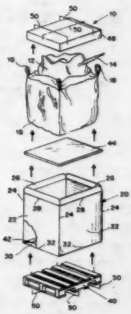
Takashi Okawa; Nobuo Isogai, and Tomoji Tsuji, all of 182, Aza Shinwari, Tayuuhama, Niigata-shi, Japan

Filed Nov. 3, 1988, Ser. No. 267,155

Claims priority, application Japan, Nov. 5, 1987, 62-278328; Apr. 1, 1988, 63-78000

Int. Cl.[5] C07C *125/06*

U.S. Cl. 560—159 7 Claims



1. A process for producing a urethane and a carbonic acid ester which comprises reacting a primary amine, carbon monoxide, molecular oxygen and an organic compound selected from the group consisting of phenols and aliphatic hydroxy compounds with one another by using a catalytic system consisting essentially of at least one member selected from the group consisting of copper and copper compounds and at least one halogen selected from the group consisting of iodine, chlorine and bromine.

4,976,680

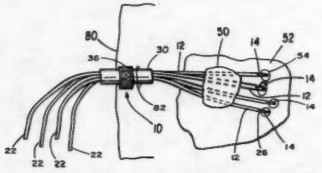
APPARATUS FOR IN SITU RADIOTHERAPY

Michael H. Hayman, 1427 Eighth St.; Lee R. Morgan, 3839 Ulloa St., both of New Orleans, La. 70119, and Samuel F. Liprie, 424 W. McNeese, Lake Charles, La. 70605

Filed Oct. 7, 1988, Ser. No. 255,045

Int. Cl.[5] A61M 36/12

U.S. Cl. 600—7 12 Claims



11. Apparatus for in situ radiotherapy of a patient, comprising:

a bushing, adapted for engagement with a body wall of the patient;

a plurality of catheters extending through the bushing, each catheter of said plurality having a proximal end including means for receiving a radioisotope and a distal end for positioning the catheter within a patient to be treated; and

sealing means connected to each of the distal ends of the catheters for sealing the distal ends of the catheters.

4,976,681

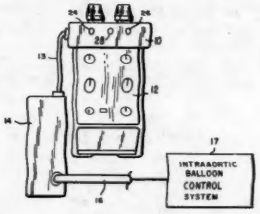
PACER INTERFACE DEVICE

Alfred E. Magro, Woburn, Mass., assignor to Aries Medical, Inc., Woburn, Mass.

Filed Apr. 27, 1988, Ser. No. 187,053

Int. Cl.[5] A61N 1/365

U.S. Cl. 600—17 8 Claims



1. An interface device comprising:

means, electrically isolated from an electronic cardiac pacer, for receiving pace signals and R wave sense signals from said cardiac pacer; and

means for providing an electrical timing signal in response to receipt of either one of said pace signals or one of said R wave sense signals by said receiving means.

4,976,682

METHODS AND APPARATUS FOR AUTOLOGOUS BLOOD RECOVERY

Perry L. Lane, 2798 Arcadia Heights Cir., Salt Lake City, Utah 84109, and Udipi R. Shettigar, 1021 Medical Plz., Salt Lake City, Utah 84112

Continuation-in-part of Ser. No. 123,809, Nov. 23, 1987, abandoned. This application Nov. 16, 1988, Ser. No. 272,241

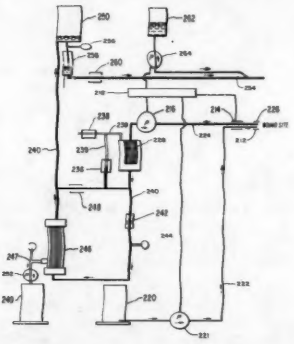
Int. Cl.[5] A61M 1/03

U.S. Cl. 604—4 59 Claims

1. A system for collecting shed blood from a patient and for subsequently reintroducing that blood to the patient, comprising:

means for introducing a controlled stream of fluid to a wound site containing blood;

means for removing the resulting mixture of blood and fluid from the would site such that substantially only the mixture is removed and such that significant amounts of air are not removed with said mixture, said removal means comprising a suction tube in communication with means



for causing suction within said suction tube, and an air detector for detecting air in the mixture of blood and fluid removed, said air detector being in communication with said suction means such that suction can be varied based upon the presence or absence of air in the mixture;

means for removing particulate impurities from the mixture;

means for removing excess fluid from the mixture such that substantially only blood remains; and

means for reinfusing the blood to the patient.

4,976,683

PERITONEAL DIALYSIS METHOD

Robert J. Gauthier, Lake Forest, Ill., and Robert S. Levinson, Saline, Mich., assignors to Abbott Laboratories, Abbott Park, Ill.

Continuation-in-part of Ser. No. 876,941, Jun. 20, 1986, abandoned. This application Jul. 18, 1988, Ser. No. 220,779

Int. Cl.[5] A61M 1/00

U.S. Cl. 604—29 24 Claims

1. A method for peritoneal dialysis of a patient in need of such treatment, comprising the steps of

(a) establishing fluid communication through the peritoneal membrane into the peritoneal cavity;

(b) instilling an initial volume of an aqueous peritoneal dialysis composition containing an osmotic agent into the peritoneal cavity through said fluid communication, said dialysis composition containing an amount of dissolved osmotic agent

(i) that is insufficent to adequately dialyze said patient during a predetermined time period of dialysis treatment, but

(ii) that is present at an osmolarity that is greater than the osmolarity of the body fluids in contact with said membrane,

such that an osmolarity gradient is created across said membrane between said composition and said body fluids by means of which gradient a flux of water and solute enters said composition from said body fluids;

(c) continually releasing additional dissolved osmotic agent into the instilled dialysis composition to form a modified dialysis composition, said additional osmotic agent being released in an amount sufficient to maintain a substantially constant osmolarity gradient between said modified dialy-

sis composition and said body fluids such that said water and solute flux continues to enter into said modified dialysis composition during said predetermined dialysis time period; and

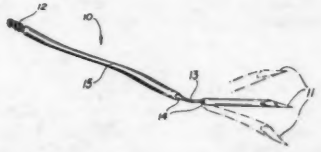
(d) substantially removing the modified dialysis composition from the peritoneal cavity at the end of said time period.

4,976,684

METHOD OF USING A BENDABLE TROCAR

Cecil H. Broadnax, Jr., Somerset, N.J., assignor to Johnson & Johnson Orthopaedics, Inc., New Brunswick, N.J.

Continuation of Ser. No. 273,547, Nov. 21, 1988, abandoned.
This application Jan. 24, 1990, Ser. No. 470,184
Int. Cl.[5] A61M 27/00
U.S. Cl. 604—51 7 Claims



1. A method for draining fluids from humans comprising:

attaching flexible tubing to a bendable trocar, said trocar having a rigid shaft with a solid generally uniform cross-section and a cutting edge on one end, means to attach said flexible tubing at the opposite end of said shaft, and said shaft having a portion of reduced cross-section relative to the generally uniform cross-section of said shaft to allow the shaft to be bent at the reduced cross-section by the user to an appropriate angle, up to about 90° without breaking through application of at least 10 pounds force, to allow the user to manipulate the trocar through the skin of said patient;

bending said trocar to a generally convenient configuration, then passing said trocar through the skin of said patient, said trocar maintaining its bent shape while embedded in said patient's skin;

passing said trocar out of the skin of said patient, while maintaining said flexible tubing within said patient's body; and

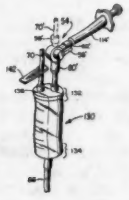
draining fluid from the patient's body through said flexible tubing.

4,976,685

METHOD OF BLOOD-GAS INTERFACE CONTROL IN SURGICAL GAS TRAPS

Frank E. Block, Jr., 5431 Millington Rd., Columbus, Ohio 43235

Filed Jun. 15, 1988, Ser. No. 207,333
Int. Cl.[5] A61M 5/16
U.S. Cl. 604—52 5 Claims



1. In a surgical procedure wherein a supply of blood is provided from refrigerated storage for infusive application to a patient through tubing extending from said supply to a warming device, and from said warming device to a location of administration to said patient, the method for removing gas products resulting from the operation of said warming device, comprising the steps of:

providing a gas trap having a substantially transparent side surface, a normally upwardly disposed entrance surface in fluid flow communication with a first length of said tubing downstream from said warming device and having a lower disposed surface spaced from said entrance surface to define a gas trap drip chamber of given volumetric capacity and in fluid flow communication with a second length of said tubing extending from said lower disposed surface to said location of administration;

flowing said blood from said supply through said warming device, thence through said gas trap to effect an accumulation of gas and blood therein to establish a blood surface-gas interface at given levels above said lower disposed surface but spaced below said entrance surface to provide an observable quantity of collected gas products;

providing a stopcock valve located next to said gas trap entrance surface having an externally accessible outlet port and manually actuable from a closed to an open position for forming a valve fluid passage path providing gas and liquid communication between said gas trap and said outlet port;

accessing said accumulation of gas when said interface level extends below an acceptable said given level by the removable insertion of the hollow stem component of a manually actuable syringe into said externally accessible outlet port; and

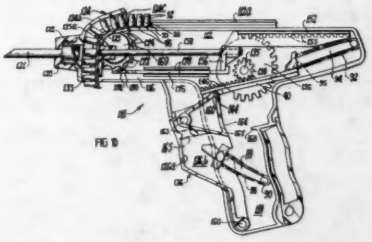
manually applying suction with said syringe at said valve fluid passage path to remove a portion of said accumulated gas of quantity sufficient to at least restore said acceptable level.

4,976,686

IMPLANT GUN

Keith V. Ball, Burwood; Karl-Heinz Halblander, Hampton Park, and Barry N. Loftus, Collingwood, all of Australia, assignors to Schering Agrochemicals Limited, Hauxton, England

Filed Sep. 19, 1988, Ser. No. 246,344
Claims priority, application Australia, Sep. 18, 1987, PI4456; Jan. 19, 1988, PI6354
Int. Cl.[5] A61M 31/00
U.S. Cl. 604—61 27 Claims



1. An implant gun for implanting an insert or pellet into or below tissue of an animal, the gun comprising a body, said body comprising a barrel, said barrel having a hand grip extending therefrom; a trigger mounted on said hand grip for successive manual firing operations; at least a portion of said barrel defining a guideway along which a series of pellets or implants are movable, said guideway comprising an outlet to define a discharge position through which said pellets or implants can be discharged from the gun, said guideway extending

forwardly along said barrel and having a terminal portion of arcuate form which curves across the outlet of said barrel; the body also housing a discharge mechanism and an advance mechanism, said discharge mechanism being operable by manual operation of said trigger when in a firing position, whereby a pellet or implant present to said discharge position can be discharged from the gun; and said advance mechanism being operable to index the series of pellets or implants along said guideway.

4,976,687

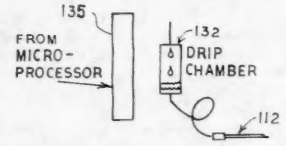
APPARATUS FOR CONTROLLING THE SUPPLYING OF INTRAVENOUS FLUIDS

James Martin, 8322 County Line Rd., Burr Ridge, Ill. 60521

Continuation-in-part of Ser. No. 48,234, May 11, 1987, abandoned. This application Jun. 3, 1988, Ser. No. 201,760

Int. Cl.[5] A61M *5/172*

U.S. Cl. 604—65 **7 Claims**



1. Apparatus for supplying a fluid to a patient, comprising in combination

a reservoir containing a quantity of said fluid,

an outlet port from said reservoir,

a cannula for insertion into said patient,

conduit means connected between said outlet port and said cannula,

flow control means connected in said conduit means for controlling the rate of flow of fluid. through said conduit means,

transducer means connected between said outlet port and said flow control means for outputting a first signal representative of the pressure in said conduit means upstream of said flow control means,

means for outputting a second signal representative of a manually set flow rate,

computer means responsive to said first and second signals for operating said flow-control means for maintaining the rate of flow of said fluid through said conduit at said manually set flow rate, and

a drip chamber connected in said conduit means between said flow control means and said cannula.

4,976,688

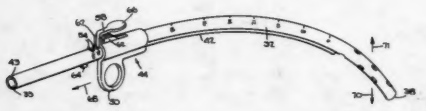
POSITION-ADJUSTABLE THORACIC CATHETER

Jeffrey L. Rosenblum, 180 Barlow Dr. South, Brooklyn, N.Y. 11234

Filed Feb. 3, 1989, Ser. No. 306,509

Int. Cl.[5] A61M *37/00*

U.S. Cl. 604—95 **12 Claims**



1. A thoracic catheter consisting essentially of (a) an elongate flexible tube for the passage of fluid into or out of the thoracic cavity of a patient, the tube having a wall, a distal end and an elongate portion for insertion into the thoracic cavity of the patient, and a proximal end that remains outside the patient, (b) control means connected to the tube for changing the curvature of at least 60% of the elongate portion of the tube that is designed to be inserted into the thoracic cavity of the patient to facilitate positioning of the distal end and the elongate portion of the tube in the thoracic cavity of the patient, (c) means defining an elongated passageway and at least one control wire having a distal end and a proximal end and extending along at least part of the length of the tube inside the means defining an elongated passageway the distal end of the at least one wire being closer to the distal end of the catheter and the proximal end of the at least one wire being closer to the proximal end of the tube, wherein the distal end of the at least one control wire is attached to the tube so that when the proximal end of the at least one wire is pulled towards the proximal end of the tube, the distal end of the tube is pulled towards the proximal end of the tube, thereby changing the curvature of at least 60% of the elongate portion of the tube that is designed to be inserted into the thoracic cavity of the patient, and (d) means for temporarily maintaining the curvature of the tube.

4,976,689

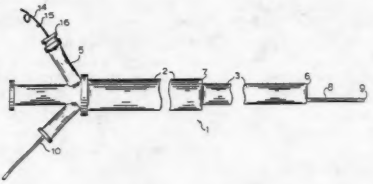
OUTER EXCHANGE CATHETER SYSTEM

Maurice Buchbinder, and Ronald J. Solar, both of San Diego, Calif., assignors to Medtronic Versaflex, Inc., Calif.

Continuation of Ser. No. 235,829, Aug. 18, 1988, Pat. No. 4,944,740, which is a continuation of Ser. No. 909,446, Sep. 19, 1986, abandoned, which is a continuation-in-part of Ser. No. 651,806, Sep. 18, 1984, abandoned. This application Nov. 4, 1988, Ser. No. 267,047

Int. Cl.[5] A61M *29/02, 25/00*

U.S. Cl. 604—95 **33 Claims**



6. An outer exchange catheter system comprising an outer catheter sheath and one or more inner catheters, wherein at least one inner catheter comprises:

a flexible catheter member comprising a spring coil body defining a lumen, said spring coil body having proximal and distal ends, the distal end of said spring coil body being open, and said spring coil body having a flexible covering thereon, and

control means attached to the proximal end of said catheter member, so that when said control means is rotated, the catheter member rotates to cause the distal end of the catheter member to rotate about its longitudinal axis.

4,976,690

VARIABLE STIFFNESS ANGIOPLASTY CATHETER

Ronald J. Solar, Minnetonka, and Jonathan Kagan, Minneapolis, both of Minn., assignors to SciMed Life Systems, Inc., Maple Grove, Minn.

Continuation of Ser. No. 394,303, Aug. 10, 1989, abandoned, which is a continuation of Ser. No. 274,738, Nov. 14, 1988, abandoned, which is a continuation of Ser. No. 135,559, Dec. 17, 1987, abandoned, which is a continuation of Ser. No. 766,763, Aug. 16, 1985, abandoned. This application Mar. 22, 1990, Ser. No. 497,812

Int. Cl.[5] A61M *29/00*

U.S. Cl. 604—96 **32 Claims**

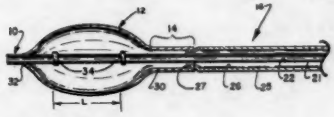
1. A coronary angioplasty dilation catheter, comprising:

(a) an elongated flexible shaft having a distal end for entry

into the vascular system and a proximal end for manipulation externally of the body and for attachment to instruments for use in a dilation procedure;

(b) means for defining a guide wire receiving lumen, so that the catheter can be advanced along a guide wire in the vascular system of the patient;

(c) an inflatable balloon member disposed at the distal end of the shaft;



(d) means for fluid communication between the proximal end of said shaft and said balloon so as to provide an inflation pressure; and

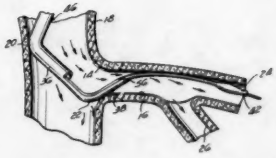
(e) means for defining a waist portion disposed between said balloon member and said shaft, said waist portion being disposed at the distal end of said shaft and being of reduced outer diameter and reduced wall thickness as compared to said shaft, the length of said waist portion between said balloon member and said shaft being equal to at least one-half of the length of said balloon member.

4,976,691

TOPLESS CATHETERS

Harvinder Sahota, 3861 Wisteria, Seal Beach, Calif. 90740

Filed Jan. 23, 1989, Ser. No. 301,179
Int. Cl.[5] A61M 29/00
U.S. Cl. 604—96 5 Claims



1. A guiding catheter for use in the diagnosis and treatment of arterial stenosis, constructed and arranged to (i) conduct radio opaque dyes into a predetermined blood vessel and (ii) guide a balloon dilation catheter into the blood vessel to relieve the stenosis, said guiding catheter comprising:

an axially elongate cylindrical shaft, having a proximal end and a distal end;

an open section having a uniform arcuate cross-sectional configuration along its length, said open section being integrally connected to said distal end of said shaft; and

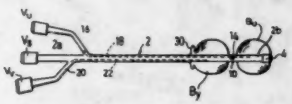
a soft tip, abutted against said open arcuate portion, and bonded thereto, said soft tip formed of a material substantially more malleable than that of said shaft.

4,976,692

CATHETER PARTICULARLY USEFUL FOR INDUCING LABOR AND/OR FOR THE APPLICATION OF A PHARMACEUTICAL SUBSTANCE TO THE CERVIX OF THE UTERUS

Jack Atad, Haifa, Israel, assignor to Travenol Laboratories (Israel) Ltd., Ashdod, Israel

Filed Sep. 25, 1989, Ser. No. 411,987
Int. Cl.[5] A61M 29/00
U.S. Cl. 604—101 12 Claims



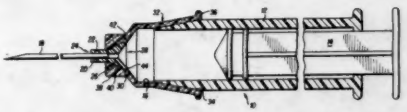
1. A catheter particularly useful for application to the cervix of the uterus in order to induce labour, comprising: a slender, flexible tube open at one end and closed at the opposite end; an inflatable distal balloon fixed to the tube at its closed end and adapted to be received in the uterus; an inflatable proximal balloon fixed to the tube at a location spaced a small distance from the distal balloon in the direction towards the open end of the tube and adapted to be received in the vagina, with the connecting portion of the tube between the two balloons passing through the cervical canal; inlet means at the open end of the tube connected by conduit means leading to the two balloons for inflating each balloon after positioned in the uterus and vagina, respectively; further inlet means at the open end of said tube for introducing a pharmaceutical substance; and an outlet opening in the connecting portion of the tube between said two balloons delivering said pharmaceutical substance to the cervical canal.

4,976,693

DEGRADABLE SYRINGE

William E. Haast, Miami Serpentarium Laboratories, Innovation Center, University of Utah Research Park, 419 Wakara Way, #100, Salt Lake City, Utah 84108

Filed Dec. 14, 1989, Ser. No. 450,528
Int. Cl.[5] A61M 5/00
U.S. Cl. 604—110 26 Claims



1. In a syringe capable of injecting a medication or solution and having a needle, a barrel and a plunger, the improvement comprising:

means for mounting the needle to the barrel, at least portions of the mounting means being formed of a material which is at least partially soluble in the medication or solution, contact between said portions of the mounting means and the medication or solution causing the mounting means to eventually become inoperable so that the syringe can be used only a single time, the mounting means comprising

a collar mounting the needle and having an annular bead formed on one end of the collar; and,

a mounting cuff at least portions of which are formed of a material which is at least partially soluble in the medication or solution, the cuff operatively connecting the barrel of the syringe with the collar which mounts the needle, the cuff having a groove formed therein for receiving the bead of the collar and positively holding the bead therein, contact between at least portions of the cuff surrounding

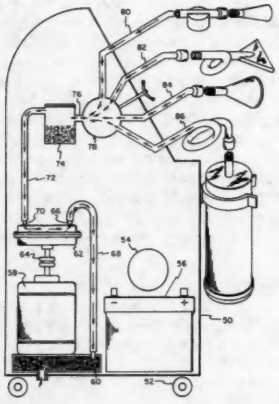
and defining the groove with the medication or solution causing softening of said portions to prevent maintenance of the collar and thus the needle mounted by the collar in an operative position relative to the barrel of the syringe.

4,976,694

APPARATUS AND METHOD FOR PREVENTING INFECTION

Gary Schreibman, P.O. Box 2746, La Mesa, Calif. 92041

Filed Dec. 15, 1988, Ser. No. 284,699
Int. Cl.[5] A61M *37/00, 1/00;* **A61B** *10/00*
U.S. Cl. 604—140 **5 Claims**



1. Apparatus for quickly removing contaminated tissue and blood from a localized skin wound of the body of a human being immediately after contamination has occurred, said apparatus comprising:

a biopsy punch for removing all the tissue from the wound:

first hose conduit means having one end connected to second means for having suction tight engagement with the wound and having an opposite end adapted to receive a force of suction, the second means including a plurality of separate elements, each one of said elements being adapted for detachable suction engagement with the body to treat a correspondingly different type of body wound, and a valve having a like plurality of input ports, each valve input port being connected to a corresponding element, the valve having a single output port connected to the one end of the first hose means, the valve being manually operable to select any one of the elements and to connect the selected one of the elements to the first hose means; and

third means for producing said force of suction, the third means including a vacuum pump having an inlet port connected to the other end of the first means and having an outlet port, the contaminated blood from the wound being removed by suction through the selected element, the valve, the first hose means, and the pump and being discharged at the outlet port of the pump.

4,976,695

IMPLANT FOR PERCUTANEOUS SAMPLING OF SEROUS FLUID AND FOR DELIVERING DRUG UPON EXTERNAL COMPRESSION

Paul Y. Wang, 47 Marblemount Crescent, Agincourt, Ontario, Canada M1T 2H5

Filed Jun. 29, 1988, Ser. No. 213,092
Claims priority, application Canada, Apr. 7, 1988, 563476
Int. Cl.[5] A61M *37/00*
U.S. Cl. 604—132 **11 Claims**

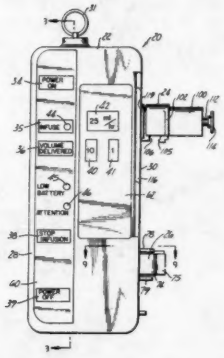
1. A self contained implantable device having a porous central body and an external self-sealing skin which is easily penetrable by a needle, said skin having a resealable orifice, whereby said central body comprises a reservoir compartment for serous fluid and said orifice permits serous fluid entry after implantation.

4,976,696

SYRINGE PUMP AND THE LIKE FOR DELIVERING MEDICATION

George Sanderson, Clark, and Robert J. Strowe, Ramsey, both of N.J., assignors to Becton, Dickinson and Company, Franklin Lakes, N.J.

Continuation of Ser. No. 083,385, Aug. 10, 1987, abandoned. This application Jun. 16, 1989, Ser. No. 368,114
Int. Cl.[5] A61M *37/00*
U.S. Cl. 604—154 **9 Claims**



1. A syringe pump comprising:

a housing having an elongate slot therethrough;

a retainer mounted on said housing for receiving therein a syringe of the type including a barrel for holding liquid medication and a plunger movably positioned in the barrel for expelling the liquid medication therefrom;

a driver movably mounted on said housing and being movable with respect to said slot, said driver positioned for engagement with said plunger for pushing said plunger into the barrel to thereby force the liquid medication out of the barrel;

protection means attached to the driver, covering said slot

and movable with respect to the slot to facilitate movement of the driver with respect to the slot and to move with the driver thereby providing constant protection of the slot so that foreign materials may be prevented from entering the housing through the slot;

control means for regulating the movement of the driver against the plunger to thereby regulate delivery of the liquid medication from the barrel; and

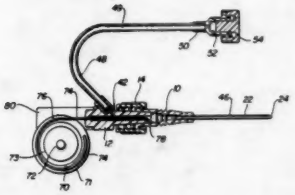
actuation means on the housing for permitting a user to select one or more functions under which the control means is to operate.

4,976,697

CATHETER OBTURATOR WITH AUTOMATIC FEED AND CONTROL

Anthony J. Walder, Franklin; Donald D. Solomon, Spring Valley; Richard W. Beck; James M. Lambert, both of Centerville, all of Ohio; Timothy Ignatius, and Mark Crawford, both of Sandy, Utah, assignors to Becton, Dickinson and Company, Franklin Lakes, N.J.

Filed Oct. 26, 1989, Ser. No. 427,422
Int. Cl.[5] A61M *5/178*
U.S. Cl. 604—164 **20 Claims**



1. An obturator rod and associated feeding arrangement therefor for feeding the obturator rod selectively into and out of the occluded position in the lumen of an in-place catheter, while maintaining sterile conditions, comprising

(a) an elongated semi-flexible obturator rod;

(b) said obturator rod having a first end and a second end;

(c) an obturator rod feed device positioned adjacent said obturator rod first end;

(d) said obturator rod feed device having

(1) a feed device body;

(2) said feed device body having a first end and a second end;

(3) said feed device body having an obturator rod passage extending from said first end to said second end;

(4) said feed device body second end for connection to the main body of an in-place catheter;

(5) said obturator rod passage in flow communication with an in-place catheter lumen of an in-place catheter connected to said main body of said obturator feed device body;

(6) means for feeding said obturator rod;

(7) said feeding means positioned on said first end of said feed device body;

(8) said feeding means including an obturator rod mover;

(9) said obturator rod mover connected to said first end of said obturator rod;

(10) said obturator rod mover for moving said second end of said obturator rod from a first position occluding the lumen of a catheter connected to said obturator rod feed device body to a second position allowing fluid through the lumen of a catheter connected to said obturator rod feed device body;

(11) sealing means on said feeding means for sealing said obturator rod from exposure in said first position or said second position; and

(e) a hydrophilic polymer coating on said obturator rod;

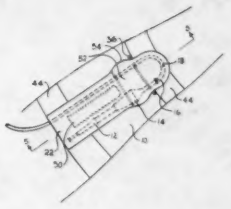
(f) said hydrophilic polymer capable of absorbing a liquid and expanding to seal to the lumen wall of an in-place catheter in the first position of said obturator rod second end.

4,976,698

INTRAVENOUS CATHETER AND TUBING STABILIZATION DEVICE

Manuel H. Stokley, Rte. 2, Box 144-D, Winnsboro, Tex. 75494

Filed Oct. 23, 1987, Ser. No. 111,584
Int. Cl.[5] A61M *5/32*
U.S. Cl. 604—174 **18 Claims**



1. A device for anchoring and stabilizing a catheter and a portion of its associated tubing relative to a patient, comprising:

a base to be positioned upon the skin of a patient adjacent to a catheter inserted through such skin, said base having a pair of elongate curved wall members, each having first and second ends, with said wall members interconnected to the surface of said base in proximity to each other so as to define an arcuate slot therebetween to receive a portion of the tubing associated with the catheter and frictionally retain said tubing without restricting the flow of fluid therethrough to effectively isolate said tubing from the catheter associated therewith;

a substantially rigid cover, with first and second ends, to be positioned over said base and releaseably interconnected thereto to anchor and retain said catheter relative to the skin of the patient and to cover and enclose said catheter and the tubing retained within said arcuate slot, said cover having an opening at one end thereof for routing of tubing associated with said catheter therethrough and away from the patient;

connector means for releaseably interconnecting said cover to said base; and

attachment means for removeably attaching said base to the skin of the patient.

4,976,699

NEEDLE AND SAFETY COVER ASSEMBLY FOR SYRINGES AND THE LIKE

Steven K. Gold, 2611 Woodberry Rd., Broomall, Pa. 19008

Filed May 24, 1989, Ser. No. 356,241
Int. Cl.[5] A61M *5/32*
U.S. Cl. 604—192 **28 Claims**

1. A needle and cover assembly comprising:

A. a base portion having a needle attached at its front end, said needle extending outward and having a tip;

B. said base portion having an attachment means located at an end opposite said needle for securing said base portion to the tip of a fluid transfer device designed for use with said attachment means;

C. a needle cover of generally U-shaped transverse cross-section;

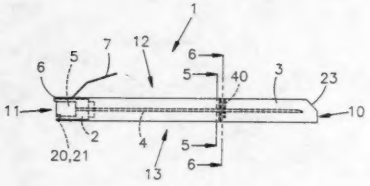
D. a hinge connecting said base portion to said needle cover for enabling said needle cover to be pivoted transverely of said needle;

E. said needle cover, when in an initial position prior to first

use of said needle being disposed about said needle and said base portion, and extending from said base portion to a front end just beyond said needle tip;

F. said cover having an opening at its back end located opposite said front end, and having a longitudinally elongated opening along the bottom side of said cover between said back and front ends to enable said cover to be pivoted transversely of said needle,

G. said cover while in said initial position extending along substantially the entire length of said base portion and said needle and also extending about more than half the periphery of said base portion and said needle to such an extent



that no part of the base portion or the needle projects laterally substantially beyond said elongated opening;

H. said needle cover having a fingertab located on the outside of said needle cover and extending outwardly from said needle cover, through which force for pivoting said needle cover relative to said base portion and needle may be applied, and

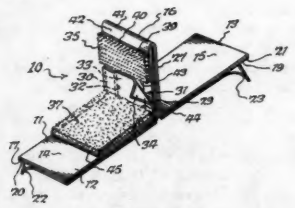
I. sealing means attached to said cover and covering said elongated opening and said opening at the back end of the cover for sealing the space within said cover surrounding the needle and the base portion from the surrounding environment when said cover is in its initial position about said needle.

4,976,700

MEDICAL SECURING TAPE

Dennis R. Tollini, 12 Palmdale Dr., Williamsville, N.Y. 14221

Filed Feb. 7, 1990, Ser. No. 476,357
Int. Cl.[5] A61M *25/02*
U.S. Cl. 604—180 **17 Claims**



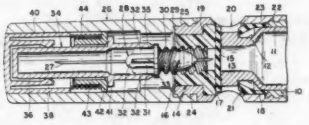
1. A securing tape for securing to a patient's skin or to a support, a medical device such as tubing, a catheter, an intravenous needle, or the like, comprising an elongated tape having an inner surface with pressure-sensitive adhesive thereon and a nonadhesive outer surface, a base portion on said elongated tape for adhesive securement to said patient's skin or to said support, a hold-down tab formed integrally with said base portion and comprising an extension thereof, said hold-down tab comprising facing adhered portions of said inner surface, an exposed portion of said inner surface on said tab, said exposed portion of said inner surface being located so that it is in facing relationship to said nonadhesive outer surface of said base portion to thereby provide adhesive securement with said medical device, and securing means for securing facing portions of said tab and said outer surface of said base portion to each other to secure said tab to said base portion in addition to said adhesive securement between said medical device and said tab.

4,976,701

INJECTION APPARATUS

Henning M. Ejlersen, Vedbaek, and Flemming Tullin, Ballerup, both of Denmark, assignors to Nordisk Gentofte A/S, Gentofte, Denmark

Filed Sep. 8, 1988, Ser. No. 241,973
Claims priority, application Denmark, Sep. 25, 1987, 5045/87
Int. Cl.[5] A61M *5/32*
U.S. Cl. 604—192 **20 Claims**



5. An injection apparatus, comprising:

a jacket having a front end;

a cartridge for containing a liquid, the cartridge being in the jacket and having a rubber membrane closing a front end of the cartridge at the front end of the jacket;

a needle having an axis and a needle holder, the needle being pointed at one end and at an axially opposite end, and the needle holder being at the front ends of the jacket and cartridge and holding the needle such a that both of the one and opposite ends thereof are exposed and oriented, the one end at the membrane for piercing the membrane, whereby to obtain the liquid from the cartridge, and the opposite end for injecting the liquid;

a cap for covering the front ends of the jacket and cartridge and for covering the needle and needle holder;

first cooperative thread means on the cap and the jacket for screwing cap onto the one of the jacket and cartridge and unscrewing the cap therefrom, the first cooperative thread means having a first pitch and a first rotational hand for the screwing;

second cooperative thread means on the needle holder and one of the cap and cartridge, the second cooperative thread means having a second pitch and a second rotational hand for screwing, the second rotational hand being the opposite of the first rotational hand for moving the needle holder and needle axially of the needle upon relative rotation between the cap and cartridge, whereby the one end of the needle pierces the membrane when the cap is unscrewed;

a protective case slidable in the cap axially of the needle for protecting the opposite end of the needle at least when the cap is screwed onto the jacket and while the cap is being unscrewed therefrom; and

a compression coil spring means in the cap and resiliently operative between the cap and protective case for sliding the protective case towards the needle holder at least while the cap is being unscrewed from the jacket.

4,976,702

SYRINGE NEEDLE GUARD

E. Trent Andrews, San Francisco, and Robert R. Moore, Hayward, both of Calif., assignors to Serad, Inc., San Francisco, Calif.

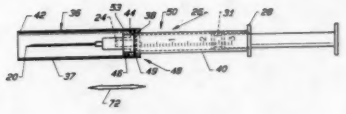
Filed Apr. 17, 1989, Ser. No. 339,399
Int. Cl.[5] A61M *5/32*
U.S. Cl. 604—198 **3 Claims**

1. A shield device for a syringe mounted pointed hypodermic needle the, syringe including a barrel with indicia, the

barrel having a tip end to accommodate the needle, and a flange end providing an opening for a piston comprising:

a. a translucent sheath said translucent sheath including a tapered inner wall forming a large end having a large transverse dimension and small end having a small transverse dimension, said sheath being extendable to a first position over the barrel adjacent the flange end of the barrel, said sheath being movable relative to the barrel and being extendable to a second position beyond the point of hypodermic needle;

b. stop means for limiting movement of said sheath between the flange end of the syringe and the tip end of the syringe.



c. means for holding said sheath in said first extended position adjacent the flange end of the barrel, said means for holding said first extended position comprising a flange extending inwardly from said small end of said translucent sheath, said flange including a surface which frictionally engages the barrel adjacent the flange end of the barrel; and

d. means for holding said sheath in said second position beyond the point of the hypodermic needle comprising a collar circumjacently positioned relative to the barrel adjacent the tip end, said collar including an outer surface frictionally engaging said tapered inner surface of said sheath at said small end thereof.

4,976,703

MEDICAL CATHETER FOR INTRAVASCULAR LONG-TERM INFUSION OF MEDICATION WITH POLYSILOXANE HYDROGEL COATING

Manfred Franetzki, Uttenreuth; Helmut Funke, Moehrendorf, and Eugen Schweiker, Bubenreuth, all of Fed. Rep. of Germany, assignors to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Feb. 15, 1989, Ser. No. 310,617

Claims priority, application Fed. Rep. of Germany, Feb. 22, 1988, 3805508

Int. Cl.[5] A61M *5/00*

U.S. Cl. 604—247 **8 Claims**

1. In a medical catheter for intravascular long-term infusion of medications by a dosage device, said medical catheter comprising a catheter tube having a longitudinal axis and a catheter tip at a distal end thereof, said tube being composed of a single layer or multiple layers of elastomer having an external protective surface layer having a smooth surface and being composed of a toxicologically faultless and biologically compatible elastic plastic material that is soft in comparison to the material lying therebelow, the improvements comprising an exit opening for the medication being arranged offset along the longitudinal axis relative to the distal end of the catheter tip and the external protective layer being composed of a hydrogel and being applied to the completely fabricated catheter, said hydrogel being a polysiloxane free of a filler.

4,976,704

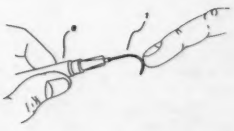
MOISTURE DISABLED NEEDLE

Donald J. McLees, 2623 Virginia Ave., Everett, Wash. 98201

Filed Jul. 17, 1989, Ser. No. 381,092

Int. Cl.[5] A61M *5/32*

U.S. Cl. 604—265 **4 Claims**



1. A hollow needle for medical purposes made at least in portion of a metal that loses its rigidity upon exposure to moisture such that after use the needle becomes incapable of repenetrating the skin.

4,976,705

MOLDED GERMANIUM AND CERAMIC ARTICLE FOR SKIN CONTACT MEDICAL TREATMENT

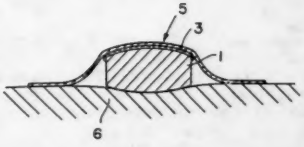
Osami Aki, Kawanishi; Yoshinori Yamamoto, Urayasu; Masayoshi Matsuoka, Habikino, and Nakao Mikami, Kusatsu, all of Japan, assignors to Kyocera Corporation, Kyoto and Takeda Chemical Industries, Ltd., Osaka, both of, Japan

Filed Jun. 14, 1989, Ser. No. 366,134

Claims priority, application Japan, Jun. 20, 1988, 63-153306

Int. Cl.[5] A61F *13/00*

U.S. Cl. 604—304 **6 Claims**



1. A molded article for skin contact medical treatment which comprises an integrally molded product of germanium and ceramic which irradiates far infrared rays by heating.

4,976,706

SHEET MATERIAL OF GERMANIUM AND CERAMIC FOR SKIN CONTACT MEDICAL TREATMENT

Osami Aki, Kawanishi; Yoshinori Yamamoto, Urayasu; Masayoshi Matsuoka, Habikino; Hideki Tachibana, Izumiotsu, and Setsumi Tanase, Sen-nangun, all of Japan, assignors to Tachibana Textile Fabrics, Co., Ltd. and Takeda Chemical Industries, Ltd., both of Osaka, Japan

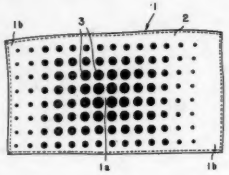
Filed Jun. 14, 1989, Ser. No. 366,135

Claims priority, application Japan, Jun. 15, 1988, 63-149053

The portion of the term of this patent subsequent to Dec. 12, 2007, has been disclaimed.

Int. Cl.[5] A61F *13/00*

U.S. Cl. 604—304 9 Claims



1. A sheet material for skin contact medical treatment at least one part of which is a therapeutically effective part comprising germanium and ceramic which irradiates far infrared rays by heating, said germanium and ceramic being provided within a distance from 0 to 3 cm of each other in said therapeutically effective part.

4,976,707

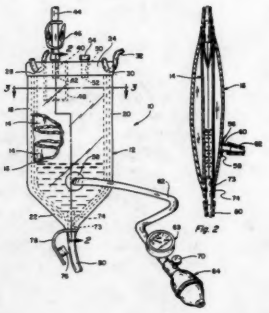
FLUID COLLECTION, STORAGE AND INFUSION APPARATUS

Raymond O. Bodicky, Oakville, and Alan B. Ranford, Creve Couer, both of Mo., assignors to Sherwood Medical Company, St. Louis, Mo.

Filed May 4, 1988, Ser. No. 190,129

Int. Cl.[5] A61B *19/00*

U.S. Cl. 604—408 12 Claims



1. A non-rigid bag-like autotransfusion device constructed of flexible wall means defining first and second fluid-tight chambers, said wall means constructed of flexible material so as to substantially completely collapsible in an empty condition in which blood can be collected and stored and from which blood can be dispensed, said wall means including at least three flexible wall members having upper and lower end edge areas sealed together, said first chamber being adapted for collecting blood and said second chamber being adjacent thereto and being adapted to be expanded for expelling blood from said first chamber, said first and second chambers being separated from each other by at least one of said wall members, spaced upper inlet and lower outlet passage means respectively through said upper and lower end edge areas in opposed relation and in fluid communication with the first chamber such that blood enters said first chamber through said upper inlet passage means at said upper end edge area and exits through said lower outlet passage means at said lower end edge area, third passage means communicating with said second chamber for directing pressurized gas thereto for expelling blood from said first chamber, support means in said upper end edge area for freely suspending said autotransfusion device in a vertical condition, first conduit means connected to said inlet passage means for communication with a source of patient's blood to be connected, second conduit means connected to said outlet passage means for infusing the blood, and clamp means positioned on said first conduit means for controlling flow therethrough, said clamp means being movable between different positions to enable or prevent fluid flow therethrough.

4,976,708

BLOOD RESERVOIR

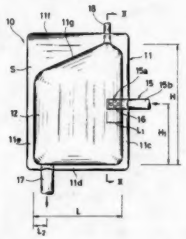
Hiroaki Oshiyama, Fuji, Japan, assignor to Terumo Kabushiki Kaisha, Tokyo, Japan

Filed Jun. 15, 1989, Ser. No. 366,731

Claims priority, application Japan, Jun. 21, 1988, 63-153020; Dec. 9, 1988, 63-311590

Int. Cl.[5] A61B *19/00*

U.S. Cl. 604—408 22 Claims



1. A blood reservoir, comprising:

a container casing defining a space for accommodating blood, said casing having a generally rectangular contour in a vertical plane defining a pair of upper and lower sides each of a length L and a pair of laterally opposed sides each of a height H when said casing assumes a vertically upright attitude,

an inlet port disposed in at least one of the laterally opposed sides of said casing for introducing blood into said space, said inlet port extending into said case horizontally a distance of L1 and having a center axis spaced apart from the lower side of said casing by a distance of H1,

an outlet port disposed in the lower side of said casing for discharging blood from said space, a center axis of said outlet port being spaced apart from the other one of said laterally opposed sides by a distance of L2, and

a vent port disposed in the upper side of said casing in fluid communication with said space;

wherein said inlet port comprises a cylindrical conduit extending from the exterior into said space through the one lateral side of said casing, and the portion of said conduit in the casing includes a closed distal end and a plurality of apertures formed in an adjoining cylindrical wall thereof for introducing blood into said space in a dispersed manner, and the following dimensional relationships are established:

L1/L is in the range of about 0.1 to 0.3;

L2/L is in the range of about 0.1 to 0.3; and

H1/H is in the range of about 0.3 to 0.6.

4,976,709

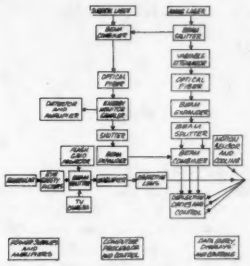
METHOD FOR COLLAGEN TREATMENT

Bruce J. Sand, 8383 Wilshire Blvd., Beverly Hills, Calif. 92011

Continuation-in-part of Ser. No. 285,379, Dec. 15, 1988, abandoned, Continuation of Ser. No. 170,070, Mar. 14, 1988, abandoned, Continuation of Ser. No. 67,381, Jun. 24, 1987, abandoned, Continuation of Ser. No. 914,169, Oct. 1, 1987, abandoned, and a continuation-in-part of Ser. No. 781,225, Sep. 27, 1985, abandoned. This application Jun. 30, 1989, Ser. No. 374,958

Int. Cl.[5] A61B *17/32*

U.S. Cl. 606—5 21 Claims



1. A method for shrinking collagen tissue comprising the step of irradiating the tissue with energy having a wavelength in the range of about 1.80 to 2.55 microns.

4,976,710

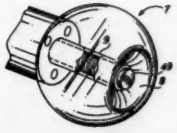
WORKING WELL BALLOON METHOD

Robert A. Mackin, 329 W. Granada Ave., Phoenix, Ariz. 85003

Division of Ser. No. 8,276, Jan. 28, 1987, Pat. No. 4,784,133. This application Nov. 15, 1988, Ser. No. 271,511

Int. Cl.[5] A61B *17/36*

U.S. Cl. 606—15 14 Claims



1. A method of using an angioscope including an inflatable, transparent balloon on the distal end portion of the angioscope, means extending through the catheter and opening into the interior of the balloon for visualizing the region adjacent to the distal end of the catheter beyond the distal portion of the transparent balloon, and a passage means for extending a channel of the catheter through a distal portion of the balloon, the method including the steps of:

(a) inserting a distal end of a flexible catheter of the angioscope into a vein, artery or other cavity, a proximal portion of the transparent balloon being sealed to a distal end of the flexible catheter, and a distal portion of the transparent balloon being sealed to a distal end portion of the passage means;

(b) using a stiff tube connected between a distal portion of the channel and an opening in a working well recess in a distal portion of the balloon as the passage means;

(c) abutting the outer surface of the distal portion of the balloon surrounding the working well recess against a wall of the intravascular structure, thereby preventing blood around the outer surface of the balloon from seeping between the wall of the intravascular structure and the distal portion of the balloon surrounding the working well recess and entering into the working well recess;

(d) inflating the transparent balloon, illuminating the region near the distal end of the flexible catheter immediately beyond the distal end of the transparent balloon through the transparent balloon, and viewing the illuminated region through the catheter and through the transparent balloon;

(e) moving a means for performing a predetermined procedure on tissue or substance in the illuminated region immediately beyond the distal end of the transparent balloon through the channel and the passage means to the tissue or substance; and

(f) performing the predetermined procedure on the illuminated tissue or substance while visualizing the procedure through the catheter and the wall of the distal portion of the balloon.

4,976,711

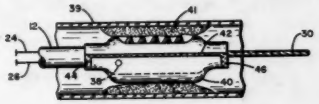
ABLATION CATHETER WITH SELECTIVELY DEPLOYABLE ELECTRODES

David J. Parins, White Bear Lake; Mark A. Rydell, Golden Valley, and Peter Staaz, Moundsview, all of Minn., assignors to Everest Medical Corporation, Brooklyn Center, Minn.

Filed Apr. 13, 1989, Ser. No. 337,426

Int. Cl.[5] A61B *17/39*

U.S. Cl. 606—48 3 Claims



1. An RF tissue ablating catheter comprising, in combination:

(a) an elongated, flexible, plastic tubular member having a proximal end and a distal end and a lumen extending from said proximal end to said distal end;

(b) a tip member affixed to the distal end of said tubular member, said tip member comprising

(i) a hollow, generally cylindrical body having a window opening formed through a sidewall of said body,

(ii) an inflatable expander bonded to said cylindrical body for producing lateral displacement of said tip member upon inflation thereof,

(iii) a pair of bipolar electrodes mounted in closely spaced relation in said body and at least a portion of said pair of electrodes being exposed through said window,

(iv) an inflation port passing through said body in fluid communication with said lumen and the interior of said expander, and

(c) conductor means extending from said proximal end of said tubular member to said pair of electrodes for applying an RF voltage across said pair of bipolar electrodes sufficient to cut tissue, the spacing between said pair of bipolar electrodes being sufficiently close to each other to permit electrical breakdown therebetween when bridged by said tissue.

4,976,712

RETAINING SLEEVE FOR SURGICAL PIN

Julius VanderSlik, 5264 Green Meadow, Kalamazoo, Mich. 49009

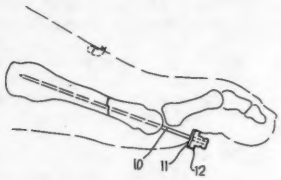
Filed Mar. 30, 1990, Ser. No. 502,413

Int. Cl.[5] A61F *5/04*

U.S. Cl. 606—59 2 Claims

1. A method for the skeletal fixation of fractured bones in a human or animal body, which comprises the steps of percuta-

neously implanting a Kirschner wire or Cerclage wire in the body so that an exposed end of said wire projects outwardly from the body; placing on the exposed end of said wire a substantially T-shaped sleeve comprised of a radially enlarged head and a thin-walled, cylindrical shank so that said head is



opposed to said body and is adapted to bear tnereagainst and said shank surrounds the exposed portion of said wire; and then crimping said shank to pinch and press it against said wire in order to fixedly unite said sleeve to the exposed end of said wire whereby said enlarged head is adapted to bear against the body and prevent migration of said wire into the body.

4,976,713

AIMING DEVICE TO POSITION AT LEAST ONE FIXING COMPONENT OF THE CENTROMEDULLAR NAIL TYPE, THROUGH AN IMPLANT

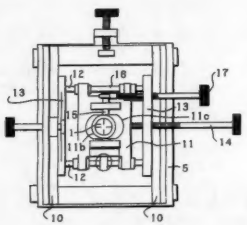
Joël Landanger, La Villeneuve, and Jean P. Michel, Rochetaillée, both of France, assignors to ICP France, France

Filed Jul. 27, 1989, Ser. No. 385,375

Claims priority, application France, Jul. 28, 1988, 88 10530

Int. Cl.[5] A61F *2/00*

U.S. Cl. 606—62 **9 Claims**



3. Aiming device for the precise and rapid positioning, in combination with a generator of x-rays, of at least one fixation member through an implant, especially of the pin type, placed in the medullary conduit of a bone, comprising a member (1) of the aiming type mounted in a support (5) with the capacity for movement and of control which is capable of recognizing the obliqueness of the x-rays while materializing them in order to position the aimer (1) in alignment with the part of the pin which is to receive the fixation member, whereby the part (5) of the support receiving the aiming member (1) is constituted by a mobile unit which is mounted transversally in a sliding manner, guided inside the fixed part (5) of the support and is subjected to a means of control and of locking in position, which unit (8) receives a carriage (11) mounted with the capacity for movement in translation and of angular movement relative to fixed profiled elements (1), each of which comprises an arcuate aperture (10*a*) whose center corresponds to the pin axis, which carriage comprises a shaft (11*b*) very perceptibly in its median part which shaft can receive the aimer (1) and is supported by two pivot spindles (15) for pivoting angularly in an aperture (11*c*) of the carriage and in a plane perpendicular to that of the circular movement of said carriage, which pivot spindles (15) are subjected to a coupling system which cooperates with a operation and regulation member (17).

4,976,714

UNIVERSAL INTRAMEDULLARY NAIL, PARTICULARLY FOR THE THIGHBONE

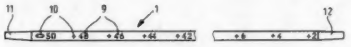
Michael Aghion, Courbevoie, France, assignor to Michael's France, Neuilly, France

Filed Jul. 5, 1989, Ser. No. 375,464

Claims priority, application France, Jul. 7, 1988, 88 09202

Int. Cl.[5] A61F *5/04*

U.S. Cl. 606—62 **12 Claims**



1. A universal intramedullary nail, particular for the thighbone, comprising a profile of constant section and resiliently deformable in the transverse direction, said section being, when at rest, sustantially inscribed within a circumference of a circle and having the general shape of a U occupying more than one half of said circumference, an end of said section ending in a circular enlargement while the other end of said section ends in an enlargement having a circular cavity complementary to said circular enlargement.

4,976,715

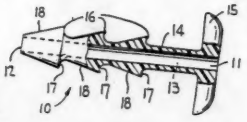
REPAIR TACK FOR BODILY TISSUE

F. Barry Bays, Seminole; Arthur F. Trott, Largo, and Sam R. Marchand, Dunedin, all of Fla., assignors to Concept, Inc., Largo, Fla.

Continuation of Ser. No. 195,417, May 16, 1988, Pat. No. 4,924,865, which is a continuation of Ser. No. 865,184, May 20, 1986, abandoned. This application Jan. 30, 1990, Ser. No. 472,298

Int. Cl.[5] A61B *17/00*; F16B *35/00*

U.S. Cl. 606—77 **14 Claims**



1. A tack for holding together tissue to permit healing in vivo comprising

a shaft having a proximal end, a distal end and a substantially cylindrical bore extending longitudinally from said proximal end to said distal end to allow a needle to pass freely entirely through said shaft to extend from said distal end for penetration in the tissue; and

a plurality of barbs disposed along said shaft, said barbs including a distal barb tapering to terminate at a sharp circular edge at said distal end of said shaft, said sharp circular edge having a diameter substantially the same as said bore to facilitate penetration and imbedding of said barbs in the tissue,

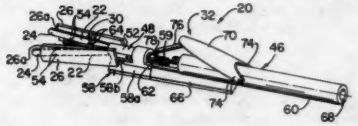
entirely of said tack being made of a biodegradable material having a degradation time selected to be at least as long as the required healing time for the tissue.

4,976,716

INTRAOCULAR LENS INSERTION DEVICE

J. Stuart Cumming, #201 1211 W. LaPalma Ave., Anaheim, Calif. 92081

Filed Jan. 23, 1989, Ser. No. 298,925
Int. Cl.[5] A61B *17/00*
U.S. Cl. 606—107 23 Claims



15. A surgical instrument for inserting a foldable intraocular lens into a patient's eye thru an corneal incision with the lens in a folded configuration and then releasing the lens within the eye for return of the lens to its normal unfolded lens configuration by elastic strain energy stored in the folded kens, said instrument comprising:

lens gripping members having slender lens gripping portions and movable away from one another to open positions wherein said gripping portions are spaced to straddle a foldable intraocular lens in its normal unfolded configuration and toward one another to closed positions to fold the lens and then grip the folded lens between said gripping portions; backup members straddling said gripping members and movable away from one another to open positions wherein said backup members are spaced to straddle said gripping members in their open positions and toward one another to closed positions to close said gripping members; means for securing said backup members in their closed positions and thereby securing said gripping members in their closed positions; and actuating means operable by the instrument user for extending said gripping portions of said gripping members beyond said backup members to permit insertion of said gripping portions into the patient's eye and separation of the gripping portions within the eye; and wherein

said instrument is manipulatable by a user with said backup members secured in their closed positions and with a folded lens gripped between said gripping portions of said lens gripping members to extend said gripping portions and the gripped folded lens into the patient's eye thru an corneal incision and then release the folded lens within the eye.

4,976,717

UTERINE RETRACTOR FOR AN ABDOMINAL HYSTERECTOMY AND METHOD OF ITS USE

Gary C. Boyle, Rte. 2, Box 14-A, Blountville, Tenn. 37617

Filed Apr. 24, 1989, Ser. No. 342,123
Int. Cl.[5] A61B *17/00*
U.S. Cl. 606—119 12 Claims

9. A method of performing an abdominal hysterectomy involving removal of the uterus from the body through an abdominal incision, the uterus having a cervix at one end connected to the vagina with a cervical canal opening into the vaginal canal and through which access is gained to the interior space of the uterus from the vaginal canal, and a fundus closing the other end of the uterus and located in the abdominal cavity, the method comprising:

providing a uterine retractor comprising elongate shaft means having first and second opposite ends, piercing means located adJacent the first end for piercing through the fundus of the uterus to dispose the first end outside the uterus in the abdominal cavity, and engagement means located adjacent the second end for engaging and moving the cervix in response to a force applied to the retraction from the first end disposed outside the uterus in the abdominal cavity;

guiding the first end of the retractor and the piercing means located adjacent thereto into the interior space of the uterus from outside the body through the vaginal and cervical canals;

causing the piercing means to pierce through the fundus of the uterus so that the first end of the retractor projects out into the adjacent abdominal cavity;

applying a force to the projecting first end of the retractor to cause the engagement means thereof to engage and move the cervix to a desired position to facilitate separation of the uterus from adjacent attached body structure including the vagina;

separating the uterus from adjacent attached body structure while the uterus is positioned for separation as aforesaid;

uniting body structure and performing necessary procedures adjacent the area from which the uterus is removed to facilitate post-operative healing and promote resumption of normal body functions; and

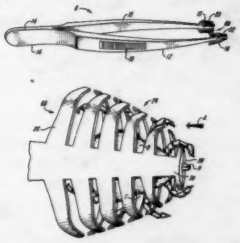
closing the abdominal incision.

4,976,718

PARASITE REMOVER

Christopher H. Daniell, R.R. 4, P.O. Box 186, Hopkinton, N.H. 03229

Filed Jun. 21, 1989, Ser. No. 369,305
Int. Cl.[5] A61B *17/50*
U.S. Cl. 606—131 22 Claims



1. Forceps for removing a parasite such as a tick from a host animal, said parasite having a body and a head smaller in cross-sectional area than the body, where the parasite has attached itself to the host at its head and the parasite contains fluids which can be expelled into the host animal upon the application of an external squeezing force, particularly a squeezing force applied to its body, comprising:

first and second opposed arms each having a distal end and a proximal end and each arm extending generally along a first direction;

means for securing said first and second arms so that they are movable in opposition to one another between an open position and a closed position in which said distal ends of said opposed arms are in contact with each other;

means mounted on said distal ends of said opposed arms for gripping the parasite, said means for gripping being

formed to engage said parasite without applying a squeezing force to any part of the parasite and with a surface positioning to abut the body of the parasite when said arms are in said closed position, and spaced from one another a sufficient distance to clear the body of the parasite when said arms are in said open position;

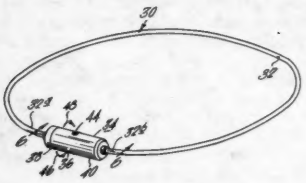
whereby when said forceps are closed on a parasite that has attached itself to the host animal without the use of an irritating stimulus, a movement of the forceps in a direction away from the host animal causes said abutting surface to obtain purchase on the body of the parasite and removes the parasite without squeezing the parasite so as to expel fluids from the parasite into the host animal.

4,976,719

DEVICE USED TO CHANGE CORNEAL CURVATURE

Steven B. Siepser, 866 Downingtown Pike, West Chester, Pa. 19380

Filed Nov. 21, 1988, Ser. No. 273,992
Int. Cl.[5] A61B *17/12*
U.S. Cl. 606—151 **3 Claims**



1. A device for changing the corneal curvature of nearsighted or farsighted persons comprising a length of surgical wire of small cross section for insertion into the stroma of the cornea of a human eye in a ring-like or circular channel in the stroma and adjustable means connecting opposite ends of said wire creating a ring of forces selectively adjustable to thereby permit selective change of the curvature of the cornea, said wire and said adjustable means generally lying on the annulus of the wire and adapted to be completely embedded in the cornea, the ends of said wire being threaded and the adjustable means comprising a turnbuckle having internal threads cooperatively associated with the ends of the wire.

4,976,720

VASCULAR CATHETERS

Timothy R. Machold, Moss Beach; Craig E. Mar, Fremont; Richard L. Mueller, Jr., Mountain View, and John P. Shanahan, San Jose, all of Calif., assignors to Advanced Cardiovascular Systems, Inc., Santa Clara, Calif.

Continuation-in-part of Ser. No. 646, Jan. 6, 1987, abandoned, and a continuation-in-part of Ser. No. 650, Jan. 6, 1987, Pat. No. 4,771,778. This application Jul. 18, 1988, Ser. No. 220,563
Int. Cl.[5] A61M *29/02*
U.S. Cl. 606—194 **11 Claims**

6. A dilatation catheter comprising:

(a) an elongated tubular member, a substantial portion of which is formed of polyamide, having a wall thickness less than about 0.003 inch an inner lumen extending therethrough;

(b) an inflatable balloon member, the proximal end of which is secured to the distal end of the thin-walled tubular member with the balloon interior being in fluid communication with the inner lumen of the thin-walled tubular member to provide inflation fluid thereto;

(c) an elongated inner member extending through the interior of the inflatable balloon member and out the distal end thereof; and

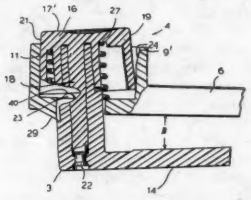
(d) means to seal the distal end of the balloon member about the portion of the elongated inner member extending through the interior of the balloon member to prevent the loss of inflation fluid from the balloon interior.

4,976,721

SURGICAL CLAMPING DEVICE

William Blasnik, Englewood, N.J., and Stanley B. Poliak, Huntington, N.Y., assignors to The Research Foundation of State University of New York, Albany, N.Y.

Filed Dec. 14, 1988, Ser. No. 284,073
Int. Cl.[5] A61B *17/12*
U.S. Cl. 606—157 **17 Claims**



1. A surgical clamping device operable between an open and closed position for occluding anatomical tubular structures, comprising:

(a) a first clamping member having a first jaw portion with a proximal end an a distal end, and a clamp housing fixed on the proximal end of said jaw portion, said clamp housing adapted to receive a second clamping member with a jaw portion opposite said first jaw portion of said first member and having an interior cavity with at least a front wall, a back wall, and a bottom wall, said bottom wall having an aperture formed therethrough;

(b) a second clamping member having a second jaw portion with a proximal end and a distal end, and a clamp base fixed to the proximal end of said jaw portion, the clamp base having a base post for passage through said aperture of said bottom wall of said housing, said base post having a bore formed therethrough, and a cap stem and a cap fixed on the cap stem, said cap adapted to fit in said clamp housing, and said cap stem being received by said bore, said cap having at least a front wall arranged adjacent and proximal to said front wall of said housing and a back wall arranged adjacent and proximal to said back wall of said housing during operation of said clamping device and adapted to orient said second member jaw portion opposite said first member jaw portion, said aperture of said bottom wall of said housing allowing pivoting of said cap stem and said base post within said housing during movement of said jaw portions between an opened and a closed position;

(c) biasing means fixed with respect to said housing and said cap to continually urge said jaws to the closed position with a force sufficient to occlude said tubular structure; and

(d) deflection means provided on said housing and said base for causing said distal ends of said jaw portions to diverge when sid device is in the open position and for causing said distal ends of said jaw portions to converge as said device closes under the force of said biasing means whereby said jaws are substantially parallel in the closed position with said tubular structure interposed therebe-

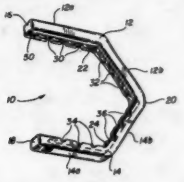
tween to provide uniformly distributed clamping pressure on said tubular structure.

4,976,722

SURGICAL HEMOSTATIC CLIPS

Stephen J. Failla, Chester, N.J., assignor to Ethicon, Inc., Somerville, N.J.

Filed May 22, 1989, Ser. No. 355,716
Int. Cl.[5] A61B *13/00*
U.S. Cl. 606—157 20 Claims



1. A hemostatic clip comprising first and second legs each leg having a tissue contacting surface and an applier contacting surface and each leg having a distal end and joined at their proximal ends in a hinge region, said first leg including a longitudinal projection extending along at least a substantial length of said first leg for engaging a longitudinal groove formed in said second leg and extending along at least a substantial length of said second leg, whereby engagement of said longitudinal projection and said longitudinal groove affords substantially gapless closure of said clip, and wherein said longitudinal groove and said longitudinal projection are formed on the tissue contacting surface of said legs, said applier contacting surfaces of said legs formed wherein the dimension between the applier contacting surface and tissue contacting surface of said second leg is greater than the dimension between the applier contacting surface and tissue contacting surface of said first leg.

4,976,723

SPECIMEN EXCISION FORCEPS

Karl Schad, Haupstrasse 28, 7201 Kolbingen, Fed. Rep. of Germany

Filed Jul. 25, 1989, Ser. No. 384,708
Claims priority, application Fed. Rep. of Germany, Jul. 27, 1988, 8809501
Int. Cl.[5] A61B *17/32*
U.S. Cl. 606—170 11 Claims

1. A surgical instrument, particularly a specimen excision forceps for endoscopy, comprising the combination of

first and second forceps legs;

a lever arm substantially rigidly attached to said first forceps leg;

means defining a pivot axis at the junction of said arm and first leg about which said arm and first leg can pivot, said second leg being rigidly attached to said means defining said pivot axis;

a guide element having means therein defining at least one guide channel for receiving and guiding said arm; and

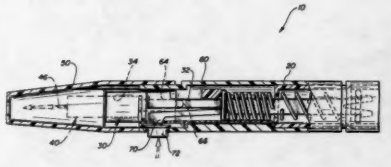
means for supporting said guide element for sliding movement relative to said pivot axis, said guide channel being formed so that movement thereof in one direction causes said arm and first leg to pivot about said pivot axis, moving said first leg toward said second leg to perform an excision.

4,976,724

LANCET EJECTOR MECHANISM

Robert L. Nieto, Pleasanton, and Chris W. Rasmussen, Felton, both of Calif., assignors to LifeScan, Inc., Mountain View, Calif.

Filed Aug. 25, 1989, Ser. No. 398,582
Int. Cl.[5] A61B *17/32*
U.S. Cl. 606—182 9 Claims



1. A device comprising:

a needle capable of being cocked and then injected into the skin by a spring-loaded mechanism, said needle removably inserted into said spring-loaded mechanism; and

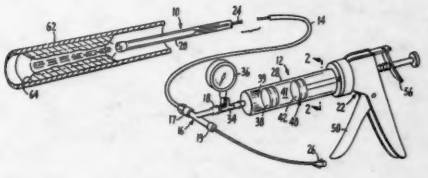
needle ejecting means placed on said spring-loaded mechanism and engageable with said needle such that said needle ejecting means are capable of moving relative to said spring loaded mechanism to exert a force against said needle to eject said needle from said mechanism, said needle ejecting means further comprising a pair of prongs which abut said needle.

4,976,725

DILATATION CATHETER AND CONSTANT PRESSURE SYRINGE AND METHOD OF USING THE SAME

Albert K. Chin, Palo Alto, and Thomas J. Fogarty, 770 Welch Rd., Palo Alto, Calif. 94304, assignors to Thomas J. Fogarty, Palo Alto, Calif.

Filed Jun. 5, 1986, Ser. No. 871,461
Int. Cl.[5] A61M *29/02*
U.S. Cl. 606—192 6 Claims



5. A method of everting and inflating an invertible-eversible balloon element of a dilatation catheter from a position within the lumen of the catheter body comprising the following steps:

disposing an incompressible fluid in the catheter body;

applying generally constant pressure to the incompressible fluid by means of a compressed body of compressible fluid

so as to subject the lumen to pressure by means of the incompressible fluid; and

extruding the balloon from the inverted position by applying axial force thereto simultaneously with the application of the pressurized fluid to the balloon by the incompressible fluid in the catheter.

4,976,726

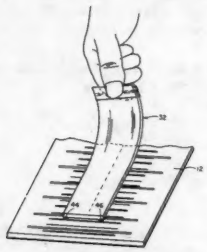
SKIN CLOSURE DEVICES

Charles B. Haverstock, 44 Frederick La., Glendale, Mo. 63122

Filed Apr. 27, 1989, Ser. No. 343,725

Int. Cl.[5] A61B *17/00;* A61L *13/00*

U.S. Cl. 606—216 **19 Claims**



1. In a skin closure means formed by a sheet of material adhesively attached to the body adjacent to and extending along a skin opening, said sheet having adjacent side edges positioned to extend along opposite side edges of the skin opening, and means bridging the skin opening for attaching portions of the sheet on opposite sides of the opening in position holding the adjacent side edges of the sheet portions and the attached opposite side edges of the skin opening together, the improvement comprising a member attachable to the skin closure extending along the skin opening and the adjacent portions of the sheet member, said member being formed of a porous and permeable material designed to hold a quantity of a medication substance that will drain between the adjacent sheet side edges to the area around the skin opening and indicator markings applied to the sheet member to provide a means for aligning corresponding portions of the skin opening with each other during skin closure.

4,976,727

SURGICAL NEEDLE

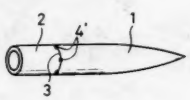
Kanji Matsutani; Masamitsu Matsutani; Tadashi Otsuka, and Yoshimasa Tochimura, all of Tochigi, Japan, assignors to Matsutani Seisakusho Co., Ltd., Tochigi, Japan

Continuation of Ser. No. 208,053, Jun. 17, 1988, Pat. No. 4,935,029. This application Dec. 13, 1989, Ser. No. 450,244

Claims priority, application Japan, Jun. 22, 1987, 62-153558; Jun. 22, 1987, 62-153560

Int. Cl.[5] A61B *17/00*

U.S. Cl. 606—223 **2 Claims**



1. A surgical needle comprising a needle member, a pipe member with a bore therein having an axis and a welded connecting means for attaching said pipe member to a proximal end of said needle member formed at a junction between the needle member and the pipe member, said welded connecting means comprising a plurality of peripherally spaced welded parts formed at the junction between the needle member and the pipe member, whereby a suture may be inserted into the bore of the pipe member and secured and wherein the welded connecting means is broken when a tension force is applied to the suture in a direction intersecting the axis.

4,976,728

REINFORCEMENT FOR A BONE CEMENT BED

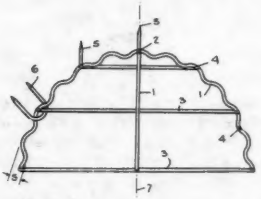
Hans-Georg Willert, Gottingen, Fed. Rep. of Germany, and Maja Burgi, Raterschen, Switzerland, assignors to Sulzer Brothers Limited, Winterthur, Switzerland

Filed Mar. 29, 1989, Ser. No. 330,604

Claims priority, application Switzerland, Mar. 29, 1988, 1182/88

Int. Cl.[5] A61F *2/32, 2/28*

U.S. Cl. 623—22 **13 Claims**



1. A wire mesh reinforcement for a bone cement bed comprising

at least two curved and corrugated structures of wire shape disposed in perpendicular crossing relation to each other to define a hemi-spherical lattice with unobstructed spaces between said structures for receiving bone cement; and

a plurality of fixing elements of spike shape disposed at least along one of said structures for securing said structures to a bone.

4,976,729

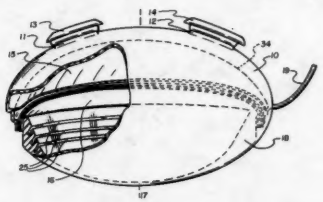
ELLIPTICAL ARTIFICIAL HEART

John W. Holfert, Bountiful, and Donald B. Olsen, Salt Lake City, both of Utah, assignors to University of Utah Research Foundation, Salt Lake City, Utah

Filed Aug. 15, 1988, Ser. No. 232,384

Int. Cl.[5] A61M *1/10*

U.S. Cl. 623—3 **9 Claims**



1. An artificial heart device for producing heart pumping action as part of a total artificial heart implant, said device comprising a semi-rigid housing of substantially ellipsoidal configuration, having elliptical cross sections at both its long and short axes and enclosing a pumping volume of sufficient capacity to sustain adequate blood flow within a living being during use, said housing having an interior surface and upper and base portions and being substantially symmetrical about its short axis;

deformable diaphragm structure attached at its perimeter to said interior housing surface approximately at the largest perimeter of the pumping volume and symmetrically about the short axis to form a deformable partition dividing the pumping volume into a blood chamber and a drive chamber, said diaphragm structure having an hemi-ellipsoidal configuration when fully extended at the end of either systole or diastole;

inlet and outlet means coupled through the housing in communication with the blood chamber for attachment in line with the circulatory system of the living being and in a flow configuration comparable to one of the two ventricles of a natural heart; and

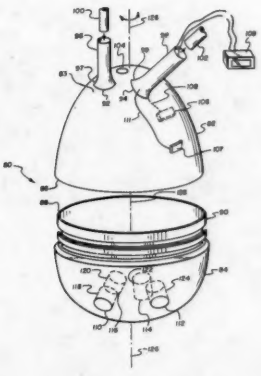
means for actuating alternating extension and collapse of the diaphragm structure with respect to the drive chamber in a recurring pumping manner to alternately expel and infuse blood from and to the blood chamber in a manner comparable to the pumping action of a natural heart.

4,976,730

ARTIFICIAL PERICARDIUM

Clifford S. Kwan-Gett, 3017 St. Mary's Circle, Salt Lake City, Utah 34108

Filed Oct. 11, 1988, Ser. No. 258,180
Int. Cl.[5] A61M *1/10*
U.S. Cl. 623—3 **22 Claims**



1. An artificial pericardium comprising:

a sac for positioning in the body of a patient to receive an artificial blood pumping device, said sac being formed of a substantially liquid impermeable material suitable for use int he body, said sac being deformable to conform to the shape of the cavity in the body into which it is to be placed, said sac being formed into an upper section and a lower section, sealably joinable by closure means unitarily formed therein, said upper section and said lower section being rotatable with respect to each other after joinder by said closure means;

first aperture means formed in said upper section to receive pumping signal supply lines operating from external said sac and external said patient to said blood pumping device; and

second aperture means formed in said lower section to register with a blood inlet line from the body and to register with a blood outlet line to the body.

4,976,731

DEVICE FOR ORBITAL IMPLANT

Arthur C. Perry, P.O. Box 1102, Rancho Santa Fe, Calif. 92067

Filed Oct. 19, 1987, Ser. No. 109,505
Int. Cl.[5] A61F *2/14*
U.S. Cl. 623—4 **19 Claims**

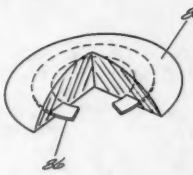
1. An orbital implant comprising a monolithic sphere of sterile, low density, porous hydroxyapatite of a size suited for insertion into the orbital socket to replace an eye removed therefrom.

4,976,732

OPTICAL LENS FOR THE HUMAN EYE

Vorosmarthy, Los Angeles, Calif., assignor to International Financial Associates Holdings, Inc., Beverly Hills, Calif.

Filed Sep. 12, 1984, Ser. No. 649,909
Int. Cl.[5] A61F *2/16*
U.S. Cl. 623—6 **18 Claims**



1. An optical lens for a human eye comprising

a lens body having a top surface and a bottom surface, said lens body having formed in the center area thereof a predetermined area of opaque material defining a ring-like annular-shaped member which is adapted to selectively intercept and pass light through the lens body along a predetermined light transmitting path in a manner to obtain an optical effect for substitution of the loss of the accommodation of an eye.

4,976,733

PREVENTION OF PROSTHESIS CALCIFICATION

Jean-Marie Girardot, Dunwoody, Ga., assignor to Biomedical Design, Inc., Atlanta, Ga.

Continuation-in-part of Ser. No. 151,653, Feb. 3, 1988, abandoned. This application Jan. 27, 1989, Ser. No. 303,577
Int. Cl.[5] A61F *2/02, 2/06, 2/22, 2/24*
U.S. Cl. 623—11 **11 Claims**

1. A prosthesis suitable for implantation in a mammal, which prosthesis has an amount of an anticalcification agent covalently coupled thereto sufficient to retard or prohibit the calcification of the prosthesis, which anticalcification agent comprises an aliphatic straight-chain or branched-chain, saturated or unsaturated, carboxylic acid or a derivative thereof, which acid contains from about 8 to about 30 carbon atoms, and which acid is substituted with an amino group, a mercapto group, a carboxyl group or a hydroxyl group, which group is covalently coupled to said prosthesis.

4,976,734

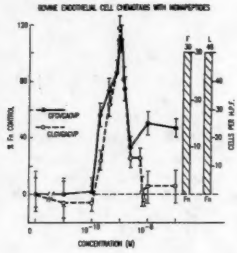
STIMULATION OF CHEMOTAXIS BY CHEMOTACTIC PEPTIDES

Dan W. Urry, and Marianna Long, both of Birmingham, Ala., assignors to UAB Research Foundation, Birmingham, Ala.

Continuation-in-part of Ser. No. 13,343, Feb. 11, 1987, abandoned, which is a continuation of Ser. No. 793,225, Oct. 31, 1985, Pat. No. 4,693,718. This application Apr. 21, 1988, Ser. No. 184,147

Int. Cl.[5] A61F *2/02*

U.S. Cl. 623—11 **9 Claims**



1. A prosthetic device wherein a surface of said device has incorporated into said surface a chemotactic peptide of the formula

$$B^1\text{-}X\text{-}(AGVPGLGVG)_n\text{-}(AGVPGFGVG)_m\text{-}Y\text{-}B^2$$

wherein

A is a peptide-forming residue of L-alanine;

P is a peptide-forming residue of L-proline;

G is a peptide-forming residue of glycine;

V is a peptide-forming residue of L-valine;

F is a peptide-forming residue of L-phenylalanine;

L is a peptide-forming residue of L-leucine;

B^1 is H or a biocompatible N-terminal group;

B^2 is OH, OB^3 where B^3 is a non-toxic metal ion, or a biocompatible C-terminal group:

X is GVPGFGVG, GVPGLGVG, VPGFGVG, VPGLGVG, PGFGVG, PGLGVG, GFGVG, GLGVG, FGVG, LGVG, GVG, VG, G or a covalent bond;

Y is AGVPGFGV, AGVPGLGV, AGVPGFG, AGVPGLG, AGVPGF, AGVPGL, AGVPG, AGVP, AGV, AG, A or a covalent bond;

n is an integer from 0 to 50;

m is an integer from 0 to 50; with the proviso that when both n and m are 0, X and Y are selected so that the chemotactic peptide has at least 3 amino acid residues in the X and Y positions combined.

4,976,735

PROSTHETIC BLADDER AND METHOD OF PROSTHESIS IMPLANTATION

Donald P. Griffith, 5696 Longmont, Houston, Tex. 77056, and Charles A. Homsy, 11562 Raintree, Houston, Tex. 77024

Filed Apr. 20, 1989, Ser. No. 341,734

Int. Cl.[5] A61F *2/04, 2/02*

U.S. Cl. 623—12 **29 Claims**

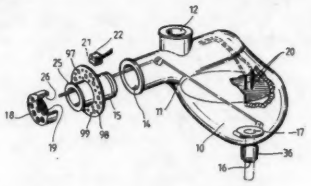
1. A prosthetic bladder suitable for implantation in a human patient, comprising:

a fixed volume reservoir made of material that is biologically compatible with organs surrounding the natural bladder;

an inlet channel integrally formed in the top of said reservoir;

a vent channel integrally formed in said reservoir and extending sufficiently outward from the upper front portion of said reservoir to reach through the abdominal wall of the patient in which said bladder is to be implanted;

a removable perforated cap affixed on the end of said vent channel;



a discharge channel integrally formed in the bottom of said reservoir

a discharge valve located in said discharge channel; and

a valve actuator coupled to said discharge valve.

4,976,736

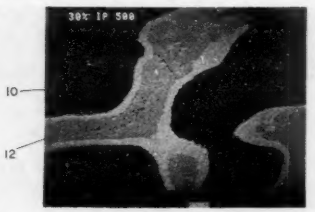
COATED BIOMATERIALS AND METHODS FOR MAKING SAME

Eugene W. White, Rossiter, Pa., and Edwin C. Shors, Rancho Palos Verdes, Calif., assignors to Interpore International, Irvine, Calif.

Filed Apr. 28, 1989, Ser. No. 345,194

Int. Cl.[5] A61F *2/28*

U.S. Cl. 623—16 **32 Claims**



1. A biomaterial comprising a base portion consisting essentially of calcium carbonate and having a surface layer of synthetic phosphate.

4,976,737

BONE RECONSTRUCTION

Donald Leake, Rolling Hills, Calif., assignor to Research and Education Institute, Inc., Torrance, Calif.

Continuation of Ser. No. 144,964, Jan. 19, 1988, abandoned. This application Mar. 14, 1990, Ser. No. 493,206

Int. Cl.[5] A61B *17/56*

U.S. Cl. 623—16 **9 Claims**

1. A method of reconstructing damaged facial skeletal features having a pre-damaged shape surrounded, at least in part, by undamaged bone, in a particular patient comprising:

first, fabricating a first three-dimensional corporeal model of the surrounding portion of undamaged bone of a particular patient's facial skeleton feature;

second, fabricating a second three-dimensional corporeal model of that section of the facial skeletal feature having the shape of the particular patient's predamaged bone;

third, forming surgical mesh material having the shape of the particular patient's pre-damaged skeletal features and joining the patient's undamaged facial skeletal features using the joined first and second three-dimensional corporeal models as template for the surgical mesh material thereby forming a customized surgical implant for the patient;

fourth, placing donor bone at the site of the facial damaged skeletal feature; and

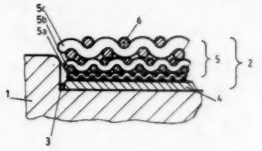
fifth, securing the customized surgical implant over the donor bone, and between the donor bone and the patient's skin, thereby providing custom shaped structural support for the donor bone lying between the donor bone and the patient's skin, and achieving a cosmetically acceptable replacement of the damaged facial skeletal feature using donor bone.

4,976,738

POROUS METAL OVERLAY FOR AN IMPLANT SURFACE

Otto Frey; Manfred Semlitsch, and Heinz Weber, all of Winterthur, Switzerland, assignors to Sulzer Brothers Limited, Winterthur, Switzerland

Filed Dec. 2, 1985, Ser. No. 803,713
Claims priority, application Switzerland, Jan. 9, 1985, 82/85-2
Int. Cl.[5] A61F *2/28*
U.S. Cl. 623—16 **17 Claims**



1. A porous metal overlay for an implant surface comprising a plurality of layers of stacked metal grids having a controlled reduction of pore size from an outer surface to an opposite inner surface, each said layer having a plurality of pores therein with the size of said pores being of decreasing size in a direction form said outer surface of said overlay to said opposite inner surface.

4,976,739

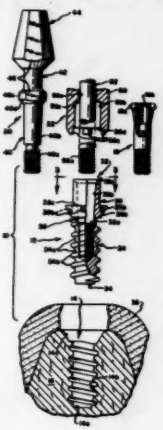
IMPLANT SYSTEM

Robert E. Duthie, Jr., 9321 Warner Gulf Rd., Holland, N.Y. 14080

Continuation of Ser. No. 863,371, May 15, 1986, abandoned.
This application Apr. 14, 1989, Ser. No. 338,543
Int. Cl.[5] A61F *2/28*; A61C *3/263*
U.S. Cl. 623—16 **11 Claims**

1. An implant for insertion within a complementarily shaped hole formed in a bone, said implant including:

a screw threaded section sized and shaped for receipt within said hole in uniform and intimate initial implant to bone contact for promoting healing osseointegration throughout the extent of said thread section without occasion for the forming of structurally weak fibrous capsules adjacent said implant, and characterized in the said screw threaded section has a smoothly contoured screw thread extending continuously throughout the length thereof, in that said threaded section has a lead so that when said threaded section is rotated one revolution it moves into a site a distance equal to the screw pitch of said threaded section, in that the thread roots and crests thereof are of curvilinear cross section, in that said thread roots and crests are joined by opposing parallel thread flanks which provide power transmission in opposite direction, and in that the width of said thread roots is greater than the width of said



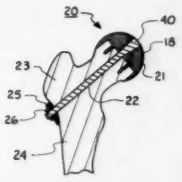
thread crests to promote healing and to provide force transfer without shear.

4,976,740

ANCHORED FEMORAL DOME

Jeffrey B. Kleiner, 6031 Tulane St., San Diego, Calif. 92122

Filed Jul. 14, 1989, Ser. No. 380,141
Int. Cl.[5] A61F *2/36*
U.S. Cl. 623—23 **12 Claims**



1. An implant, engageable with a sculpted femoral head having a prepared channel therethrough, for use as a body joint element which comprises:

a dome, shaped as a solid hemisphere, defining an outer hemispherical bearing surface terminating in a flat lower bone-engaging surface, said dome being formed with a hole, said flat surface of said dome for abutting against said femoral head, said flat surface being textured and having a plurality of spikes extending outwardly therefrom to hold said dome to said sculpted surface; and

an elongated compression bolt terminating at opposite first and second ends and insertable through said hole and through said prepared channel, said first end including engaging means for attachment to said dome, said second end adapted to be engageable with a fixation means coupled to said second end for holding said flat surface against said sculpted head.

4,976,741

ANTISTATIC AGENT: MIXTURE OF ANIONIC SURFACTANT AND A FLUORINE-CONTAINING NONIONIC SURFACTANT

Iwao Hisamoto; Masaru Hirai, and Sueyoshi Ishikawa, all of Osaka, Japan, assignors to Daikin Industries Ltd., Osaka, Japan

Filed Jun. 12, 1986, Ser. No. 873,492
Claims priority, application Japan, Jun. 13, 1985, 60-128847
Int. Cl.[5] C08K *5/00*
U.S. Cl. 8—115.6 6 Claims

1. An antistatic agent comprising a non-fluorine-containing anionic surfactant and a fluorine-containing nonionic surfactant in a weight ratio of 95:5 to 5:95,

wherein the non-fluorine-containing anionic surfactant is a carboxylate, sulfonate, sulfuric acid ester salt, or phosphoric acid ester salt,

and wherein the fluorine-containing nonionic surfactant contains 10 to 70% by weight of fluorine.

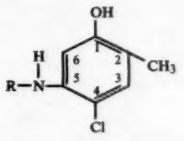
4,976,742

META-AMINOPHENOLS USEFUL AS OXIDATION HAIR DYE COUPLERS

David Rose, Hilden; Edgar Lieske, Duesseldorf, and Norbert Maak, Neuss, all of Fed. Rep. of Germany, assignors to Henkel Kommanditgesellschaft auf Aktien, Duesseldorf-Holthausen, Fed. Rep. of Germany

Continuation of Ser. No. 878,557, Jun. 26, 1986, abandoned.
This application May 6, 1988, Ser. No. 191,722
Claims priority, application Fed. Rep. of Germany, Jul. 8, 1985, 3524329
Int. Cl.[5] A61K *7/13*; C07C *211/00*
U.S. Cl. 8—412 16 Claims

11. In an oxidation hair dye comprising as its coloring components at least one coupler and at least one developer selected from the group consisting of p-phenylene diamine, p-tolylene diamine, and mixtures thereof in a mole ratio of 1:0.5–2, the improvement wherein said at least one coupler consists essentially of a meta-aminophenol compound of the formula



wherein R is H, a C_{1-4} alkyl group, or a C_{2-4} hydroxyalkyl group; or a water-soluble salt thereof.

4,976,743

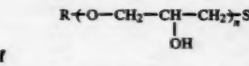
DYEING AUXILIARY COMPOSITION: LEVELLING AGENT FOR REACTIVE DYES CONTAINING HYDROXY SULFONIC ACID ANIONIC SURFACTANT AND POLY-BASIC POLYMER

Noriaki Ohba; Yujin Tabata, both of Tokyo; Masaaki Nagatsuka, Saitama; Tateyuki Nagatomi, Tokyo, and Helmut Klicker, Hyogo, all of Japan, assignors to Nihon Surfactant Kogyo K.K., Tokyo, Japan

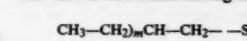
Filed Mar. 31, 1989, Ser. No. 331,902
Claims priority, application Japan, Jul. 4, 1988, 63-166385
Int. Cl.[5] D06P *1/62, 3/00*; C09B *67/00*
U.S. Cl. 8—543 8 Claims

1. A dyeing auxiliary composition, comprising:

at least one anionic surfactant selected from the group consisting of anionic surfactants having the formula



and anionic surfactants having the formula



wherein R is an aliphatic hydrocarbon group having 6 to 18 carbon atoms, alkylphenyl having 7 to 18 carbon atoms or phenyl, n is an integer of 1 to 3, m is an integer of 6 to 15, and M is ammonium, alkanolamine, alkali metal or alkaline earth metal,

and an organic polybasic polymer selected from the group consisting of polyacrylic acid, polymethacrylic acid, carboxymethylcellulose, maleic acid/acrylic acid copolymer, styrene/maleic acid copolymer, polystyrenesulfonic acid, maleic acid/styrenesulfonic acid copolymer, olefin/ethylenically dicarboxylic acid anhydride copolymers and salts thereof.

4,976,744

PREPARATION OF CONCENTRATED SOLUTIONS OF CATIONIC DYES AS MONO-CARBOXYLATES IN GLYCOL ETHER

Johannes P. Dix, Neuhofen; Guenter Hansen, Ludwigshafen, and Hellmut Kast, Bobenheim-Boxheim, all of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

Filed Sep. 12, 1989, Ser. No. 406,244
Claims priority, application Fed. Rep. of Germany, Sep. 30, 1988, 3833195
Int. Cl.[5] C09B *67/34, 69/06*
U.S. Cl. 8—527 4 Claims

1. A process for preparing a concentrated solution of cationic dye, which comprises treating the cationic dye, which contains as the counterion the anion customarily present during its preparation, with an alkali metal salt of a monocarboxylic acid and with or without a complexing agent in a reaction medium containing water and a glycol ether which is not completely miscible with salt containing water, and separating off the organic phase, which contains the cationic dye in the form of its monocarboxylic acid salt.

4,976,745

PROCESS FOR STABILIZING A HYDROCARBON IN WATER EMULSION AND RESULTING EMULSION PRODUCT

Domingo Rodriguez; Lirio Quintero; Maria T. Terrer; Euler Jimenez; Felix Silva, and Jose Salazar, all of Apdo. 76343, Caracas 1070A, Venezuela

Continuation-in-part of Ser. No. 133,323, Dec. 16, 1987, Pat. No. 4,824,439, Ser. No. 14,871, Feb. 17, 1987, Pat. No. 4,834,775, which is a continuation-in-part of Ser. No. 875,450, Jun. 17, 1986, Pat. No. 4,801,304. This application Apr. 24, 1989, Ser. No. 342,148
Int. Cl.[5] C10L *1/32*
U.S. Cl. 44—301 19 Claims

1. A process for stabilizing a hydrocarbon-in-water emulsion comprising forming a hydrocarbon-in-water emulsion by admixing a hydrocarbon selected from the group consisting of heavy crudes and bitumen, having a viscosity at 122° F. of about or greater than or equal to 1,000 (CST) and a viscosity at 74° F. of about or equal to or greater than 9,000 (CST) and an API° gravity below 18, water, an emulsifier and a water soluble stabilizing additive of Al^{+++} in a concentration of greater than 30 ppm with respect to the total emulsion volume.

279-054 O.G.-90-10

4,976,746

FORMULATIONS OF NITROGENATED ADDITIVES FOR ENGINE FUELS AND THE ENGINE FUELS CONTAINING THEM

Jacques Denis, Charbonniere les Bains; Xavier Montagne, Paris; Philippe Mulard, Saint Pierre de Chandieu, and Danièle Eber, Lyons, all of France, assignors to Institut Francais du Petrole, Rueil Malmaison, France

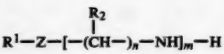
Filed Jun. 28, 1989, Ser. No. 372,598

Claims priority, application France, Jun. 29, 1988, 88 08900

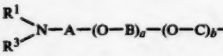
Int. Cl.[5] C10L *1/22, 10/02, 10/04*

U.S. Cl. 44—330 **14 Claims**

1. An additive composition for engine fuels, comprising a constituent (A) and a constituent (B), said constituent (A) consisting of at least one nitrogen compound resulting from the reaction of an alkenylsuccinic or polyalkenylsuccinic anhydride with an average molecular mass ranging from 200 to 3,000 with at least one polyamine of the general formula:



(I)



(II)

in which Z is —NR[3] and R[1] and R[3], identical or different, represent each an atom of hydrogen or a hydrocarbon group with 1 to 30 atoms of carbon, each R[2] independently represents an atom of hydrogen or a methyl group, n is an integral number from 2 to 4 and m is an integral number from 1 to 5, A, B, C and D, identical or different, represent each a divalent hydrocarbon group with 2 to 6 atoms of carbon, a is an integral number from 1 to 120, b and c, identical or different, are each zero, or a is an integral number from 1 to 59 and c is zero or an integral number such that a+c is 1 to 59 and b is an integral number from 1 to 50, and the sum a+b+c is an integral number from 1 to 120 and said constituent (B) consisting of at least one nitrogen compound resulting from the reaction of an alkenylsuccinic or a polyalkenylsuccinic anhydride with an average molecular mass ranging from 200 to 3,000 with at least one 1-(2-hydroxyethyl-imidazoline substituted in the 2-position by an alkyl or alkenyl radical, linear or branched, with 1 to 25 atoms of carbon, and wherein the molar ratio of constituent (A) to constituent (B) ranges from 0.2:1 to 5:1.

4,976,747

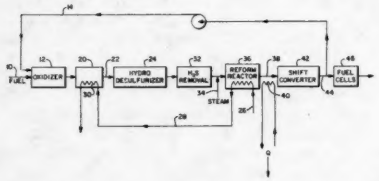
FUEL TREATMENT APPARATUS FOR FUEL CELLS

Donald F. Szydlowski, Ellington, and Roger R. Lesieur, Enfield, both of Conn., assignors to International Fuel Cells Corporation, South Windsor, Conn.

Filed Oct. 10, 1989, Ser. No. 419,880

Int. Cl.[5] B01J *12/00*

U.S. Cl. 48—127.9 **7 Claims**



1. A fuel reforming apparatus for a fuel cell tolerant of variations in oxygen content in the fresh fuel supply comprising:

means defining an oxidizer containing a catalyst for catalyzing an oxidation reaction consuming oxygen, and having a minimum ignition temperature;

a fuel supply means for supplying fresh fuel to said oxidizer;

means defining hydrodesulfurizer connected to said oxidizer means for receiving fuel from said oxidizer for converting sulfur to H_2S and a removal device connected for receiving fuel from said hydrodesulfurizer for removing H_2S from said fuel;

a reform reactor connected for receiving fuel from said H_2S removal device for increasing the molecular hydrogen content of the fuel;

a recycle means for returning a recycled portion of the reformed fuel from a location downstream of said reform reactor to said oxider means; and

said oxidizer means including means arranged for heating only a portion of said fresh fuel comprising means for initially mixing said recycled portion with only a portion of said fresh fuel and exposing this portion to the catalyst, and for thereafter heating the remaining fresh fuel in the presence of the catalyst.

4,976,748

VORTEX TUBE SEPARATING DEVICE

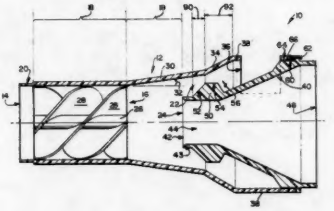
Willem J. C. Prinsloo, Pretoria; Pierre de Villiers, Hartbeespoort, and Marten C. van Dijken, Pretoria, all of South Africa, assignors to Cyclofil (Proprietary) Limited, Pretoria, South Africa

Filed Jun. 1, 1989, Ser. No. 360,160

Claims priority, application South Africa, Jun. 2, 1988, 88/3923; Feb. 14, 1989, 89/1144

Int. Cl.[5] B01D *45/12*

U.S. Cl. 55—1 **8 Claims**



1. In an apparatus for treating a particle containing gas flow stream to clean the gas of particles or to recover particles from the gas the apparatus comprising:

an outer round tube having an inlet at one end which will be an upstream end in use and an opposed end which will be a downstream end in use;

an axially arranged vortex generator in the tube downstream of the inlet;

a separation region downstream of the vortex generator;

an inner round extraction tube, arranged concentrically within the outer round tube toward the downstream end of said outer round tube, said inner round tube having an inlet at a predetermined axial position corresponding to the end of the separation region, and central outlet means at a downstream end thereof;

a peripheral outlet region annularly intermediate said outer round tube and said inner round extraction tube;

a central outlet region formed by said inner round extraction tube; and

outlet means downstream of the peripheral outlet region;

an acceleration-deceleration formation in the form of a ring having, in series, a divergent portion, a crown, and a convergent portion, the ring being located annularly around the inner round extraction tube and spatially to the inlet of the inner round extraction tube, to form in the peripheral outlet region, in series, and spaced from the

inlet of the inner round extraction tube, an annular acceleration region, an annular orifice and an annular diffuser region;

the method of flow comprising:

introducing the particle containing gas flow stream axially into the outer round tube via said inlet;

inducing rotating flow in the particle containing gas flow stream by guiding the gas flow stream through the vortex generator;

allowing the particles to migrate toward and to concentrate toward the outer periphery of the flow stream while the flow stream flows through the vortex generator and the separation region;

guiding a particle depleted portion of the flow stream, toward the center of the tube, via the central outlet region through the central outlet means;

guiding a particle enriched portion of the flow stream, toward the outer periphery of the tube, via the peripheral outlet region through the outlet means including the steps of contracting and accelerating the particle enriched portion of the flow stream in the annular acceleration region and transforming dynamic pressure in the particle enriched flow stream into static pressure by allowing the particle enriched flow stream to diffuse in the annular diffuser region.

4,976,749

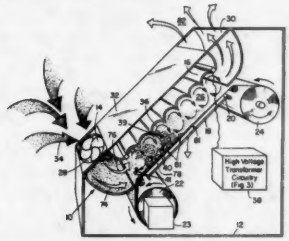
AIR FILTER AND PARTICLE REMOVAL SYSTEM

Joseph R. Adamski, and John S. Sklenak, both of Sudbury, Mass., assignors to Raytheon Company, Lexington, Mass.

Continuation of Ser. No. 342,151, Apr. 24, 1989, abandoned. This application Mar. 26, 1990, Ser. No. 501,347

Int. Cl.[5] B03C *3/00*

U.S. Cl. 55—6 **13 Claims**



10. The method of removing charged particles from a gas stream comprising the steps of:

providing a first plate having a first surface;

providing a second plate having a second surface facing said first surface of said first plate;

directing the gas stream between said first and second surfaces of said first and second plates;

providing said first plate within an alternating polarity electric potential with respect to said second plate to move said charged particles in said gas toward said second plate;

varying the rate of alternating said polarity of said electric potential in accordance with the rate said gas stream is directed between said first and second plates; and

providing an adhesive paper disposed over said second plate to catch said particles.

4,976,750

METHOD AND DEVICE FOR THE CONTROL OF GAS CHROMATOGRAPHIC FUNCTIONS

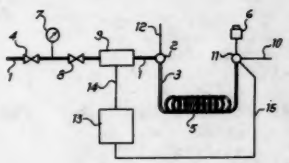
Fausto Munari, Milan, Italy, assignor to Carlo Erba Strumentazione S.p.A., Italy

Filed Aug. 15, 1989, Ser. No. 394,004

Claims priority, application Italy, Aug. 22, 1988, 21728 A/88

Int. Cl.[5] B01D *15/08*

U.S. Cl. 55—21 **16 Claims**



1. A method for detecting quantitative variations in the passage of a fluid sample comprising solvent and eluent through a column or precolumn of a gas chromatograph having a plurality of functions in order to control at least one of said functions, said method comprising:

introducing said fluid sample at a fluid sample introduction point upstream of said precolumn, which precolumn is upstream of said column;

feeding a carrier gas at a carrier gas feeding point upstream of said fluid sample introduction point so that said carrier gas carries said fluid sample in a downstream direction through said precolumn and said column;

heating said fluid sample in said precolumn so that at least said solvent vaporizes;

detecting variations of the pressure or flow of said carrier gas upstream of said fluid sample introduction point; and controlling at least one of said plurality of functions of said gas chromatograph in response to said detected variations.

4,976,751

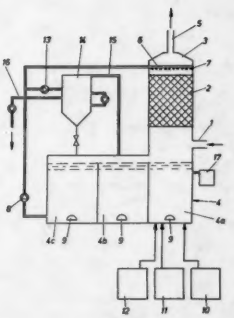
METHOD FOR PURIFICATION OF EXHAUST AIR

Egbert Schippert, Dierdorf, Fed. Rep. of Germany, assignor to Keramchemie GmbH, Siershahn, Fed. Rep. of Germany

Continuation-in-part of Ser. No. 177,635, Apr. 5, 1988, abandoned. This application Sep. 19, 1989, Ser. No. 409,281

Int. Cl.[5] B01D *47/00*

U.S. Cl. 55—84 **6 Claims**



1. A method of purifying exhaust air containing impurities which are biologically degradable and are particularly difficultly soluble in water, comprising conducting the exhaust air through an absorption tower, absorbing the impurities by a washing liquid composed of water containing 1 to 15 g per liter

activated sludge and subsequently biologically degrading the impurities in an activated sludge tank by the microorganisms of the activated sludge, and adding a high-boiling organic solvent in an amount of 5 to 35% to the washing liquid containing the activated sludge, wherein the organic solvent is selected from the group consisting of dialkyl phthalate, methyl silicone oil, trimellitic acid ester and modified silicone oils inn which 20% to 80% of the methyl group are substituted by hexyl groups or phenyl propyl groups, and wherein the organic solvent has the following properties:

a. a very low vapor pressure of less than 50 mg per cubic meter at normal temperature;

b. a high dissolving power for organic substances, such that the organic solvent is mixable in any ratio with the impurities to be absorbed;

c. together with water being in the form of a coarse dispersion or a fine emulsion which has no toxic or other harmful effects on the microorganisms;

d. less than 10 mg per liter are soluble in water; and

e. a low biological degradability of less than 50 mg per liter an hour.

4,976,752

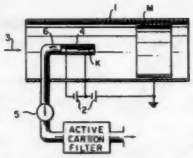
ARRANGEMENT FOR GENERATING AN ELECTRIC CORONA DISCHARGE IN AIR

Vilmos Török, Lindingö , and Andrezej Loreth, ÅAkersberga, both of Sweden, assignors to Astra Vent AB, Stockholm, Sweden

Division of Ser. No. 252,362, Sep. 26, 1988. This application Apr. 10, 1990, Ser. No. 506,736

Int. Cl.[5] B03C *3/00*

U.S. Cl. 55—117 **9 Claims**



1. An arrangement for generating an electric corona discharge in an airflow path which is in communication with a human environment and continuously removing harmful gases produced as a consequence of the corona discharge from the airflow path, comprising:

a duct having an airflow therethrough;

a corona electrode, and a target electrode spaced from said corona electrode in said airflow of said duct downstream of said corona electrode as seen in the direction of said airflow;

a d.c. voltage source having first and second terminals to which said corona electrode and said target electrode, respectively, are connected, the voltage between said terminals of said voltage source capable of creating a corona discharge at said corona electrode;

piping means to continuously remove harmful gases produced as a consequence of said corona discharge, extending from inside said duct and out of said duct, and including a pipe with an orifice at one end thereof;

said orifice of said pipe facing in the downstream direction of said airflow and towards said target electrode, and said corona electrode being located substantially centrally in said orifice, and said pipe over the remainder of its length being hermetically sealed relative to said airflow in said duct;

an air pumping means connected to said pipe for generating a flow of air into said pipe through said orifice closely past said corona electrode.

4,976,753

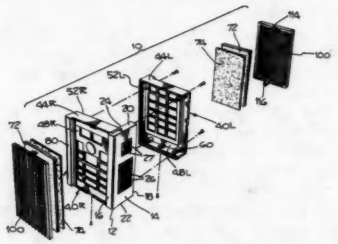
SNAP-TOGETHER HOUSING FOR SMALL APPLIANCES

Jyh C. Huang, Cerritos, Calif., assignor to Tatung Company of America, Inc., Long Beach, Calif.

Filed Sep. 1, 1989, Ser. No. 401,804

Int. Cl.[5] B03C *3/82*; F16B *12/12*

U.S. Cl. 55—124 **10 Claims**



1. A three-piece, snap-together appliance housing, comprising:

a box-like front part having a front panel, two side panels, top and bottom panels, and an open rear end; and

first and second box-like side parts which are generally symmetrical to each other about a sagittal plane through the middle of the front panel, each side part having a rear panel, top and bottom panels, a lateral side panel, an open front end, and an open medial side,

the first and second side parts each having a medial edge extending around a respective one of the open medial sides of each of the side parts generally coextensively with a respective one of the top, rear, and bottom panels of each of the side parts, and front edges extending around a respective one of the open front ends of each of the side parts generally coextensively with a respective one of the top, side, and bottom panels of each of the side parts,

the first side part having a medially-protruding lip extending around the open medial side of the first side part generally coextensively with the top, rear, and bottom panels of the first side part and inboard of the medial edges of the first side part,

the lip on the first side part being inserted laterally into the open medial side of the second side part in a tight, overlapping fit with interior surfaces of respective ones of the top, bottom, and rear panels of the second side part and holding respective ones of the medial edges of the first and second side parts in abutment along the sagittal plane, with corresponding ones of the top, bottom, and rear panels of the first and second side parts coplanar,

the front part having rear edges extending around the open rear end of the front part coextensively with the top, bottom, and two side panels of the front part, and a flange extending around the open rear end of the front part inboard of the rear edges of the front part and protruding in a rearward direction, defined as the direction extending from the front panel of the front part and toward the open rear end of the front part,

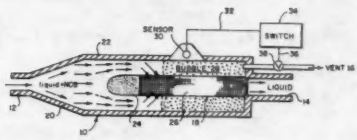
the flange on the front part being inserted rearwardly into the open front ends of the side parts in a tight, overlapping fit with inner surfaces of respective ones of the top, bottom, and lateral side panels of the first and second side parts and holding the rear edges of the front part in coplanar abutment with corresponding ones of the front edges of the first and second side parts, with corresponding ones of the top, bottom and side panels of the front part coplanar with corresponding ones of the top, bottom, and side panels of the first and second side parts.

4,976,754

LIQUID LINE NON-CONDENSIBLE GAS TRAP

Fred Edelstein, Hauppauge; Maria Liandris, Long Island City, and Richard F. Brown, Hauppauge, all of N.Y., assignors to Grumman Aerospace Corporation, Bethpage, N.Y.

Filed Dec. 5, 1989, Ser. No. 446,355
Int. Cl.[5] B01D *19/00*
U.S. Cl. 55—159 4 Claims



1. A liquid line trap for non-condensible gases comprising:

a generally cylindrical member having an inlet at one end and outlet at a second end;

a mesh tube axially positioned within the member and secured to the second end, over the outlet, leaving an annular space between the entire tube length and the member through which liquid, filling the entire space, can flow radially inwards to the outlet, capillary action of the mesh tube trapping non-condensible gas within the annular space;

sensing means located along the cylindrical member for sensing a preselected accumulation of non-condensible gas in the annular space; and

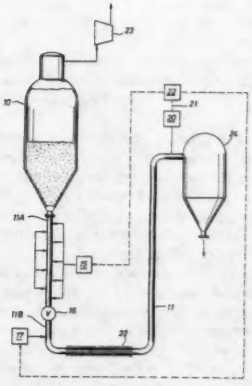
timed valve means connected to the cylindrical member for venting the preselected accumulated gas from the trap thus ridding the liquid of the gas without liquid loss.

4,976,755

STRIPPING AND DEPRESSURIZATION OF SOLIDS AND GAS MIXTURE

Thomas S. Dewitz, Houston, Tex., assignor to Shell Oil Company, Houston, Tex.

Filed Oct. 19, 1989, Ser. No. 423,825
Int. Cl.[5] B01D *19/00*
U.S. Cl. 55—161 2 Claims



2. An apparatus for stripping and depressurizing fine particles mixed with gas discharged from a vessel operated at elevated temperature and pressure conditions, said apparatus comprising:

means for receiving and conveying said mixture from said vessel, said means for receiving and conveying extending downwardly from said vessel, said means having upper and lower ends;

means for selectively injecting gas into said means for receiving and conveying said mixture, thereby stripping said particulates of entrained synthesis gas;

means for maintaining a substantially constant fraction of gas volume to particulates volume in said means for receiving and conveying said mixture;

means for maintaining a higher pressure at the lower end of said means for receiving and conveying said mixture than the pressure within sad vessel; and

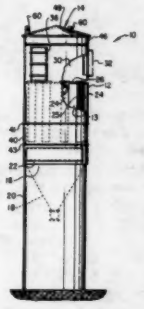
means located downstream from said lower end, for decreasing the pressure in said means for receiving and conveying said mixture wherein said means for decreasing pressure includes means for gradually increasing the diameter of said means for receiving and conveying said mixture.

4,976,756

DUST COLLECTOR HOUSING WITH REMOVABLE ROOF SECTION

Loren K. Dobyns, Gillette; Gary S. Hanson, and Durel B. Shrum, both of Wright, all of Wyo., assignors to Atlantic Richfield Company, Los Angeles, Calif.

Filed Jan. 16, 1990, Ser. No. 464,801
Int. Cl.[5] B01D *46/02, 46/04*
U.S. Cl. 55—341.100 6 Claims



1. A dust collector apparatus including a baghouse having a housing section defining an interior space delimited by a deck, a plurality of filter elements disposed within said interior space and supported in depending fashion from said deck, said interior space forming between said deck and a roof section of said apparatus a clean air plenum;

a removable roof section delimiting the upper end of said clean air plenum, said roof section being adapted to be connected to and disconnected from said housing section by means accessible from within said clean air plenum; and

means for accessing said clean air plenum for disconnecting said roof section from said housing section so that said roof section may be removed from said housing section to permit removal of said filter elements from said deck.

4,976,757

FILTRATION PLENUM MODULE CONSTRUCTED FOR ON-SITE ASSEMBLY

Martin C. Helmus, Wyoming, Mich., assignor to Comp-Aire Systems, Inc., Grand Rapids, Mich.

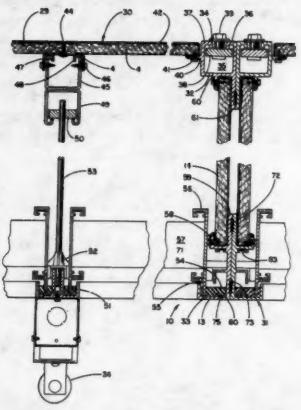
Filed May 4, 1989, Ser. No. 347,479
Int. Cl.[5] B01D *46/00*
U.S. Cl. 55—355 12 Claims

1. A modular filter plenum, comprising:

an upper peripheral frame having a cross-section providing a downwardly-open channel defined by spaced inner and

outer vertical flanges, and also providing a horizontal inner shelf;

a lower peripheral frame having a cross-section providing an upwardly open first channel defined by spaced vertical inner and outer vertical flanges, and in vertical alignment with said downwardly-open channel, and also providing an upwardly open sealing channel disposed below said first channel, said lower peripheral frame having means



adapted to receive and support filter elements engaging said sealing channel;

vertical panels having the vertically opposite edges thereof received in said downwardly open and first upwardly open channels, respectively;

horizontal panel means received on said shelf; and

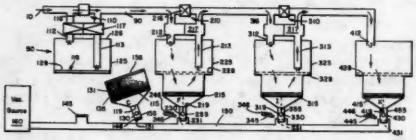
securing means traversing said inner flanges and shelf, and engaging said panels, respectively.

4,976,758

APPARATUS FOR VACUUM CLEANER WITH UNINTERRUPTED AND UNDIMINISHED PERFORMANCE

Richard C. K. Yen, 1440 E. Comstock Ave., Glendora, Calif. 91740

Filed Sep. 14, 1989, Ser. No. 407,414
Int. Cl.[5] B01D *50/00*
U.S. Cl. 55—350 **12 Claims**



1. A vacuum cleaner comprising:

a. a multiplicity of vacuum canisters connected to each other in series;

b. the first of said multiplicity of vacuum canisters further comprising:

(i) a fixed canister body including an interior, an upper end and a lower end,

(ii) a removable canister body having an upper end and a lower end, the removable canister body removably connected at its upper end to the lower end of said fixed canister body and in fluid communication therewith,

(iii) an inlet hose connecting a dirty fluid inlet hose to the interior of the fixed canister body,

(iv) an exit hose extending from within the fixed canister body to a canister connection hose which connects the first of said multiplicity of canisters to the inlet hose of the next in the series of said multiplicity of canisters,

(v) a filter extending across the interior of the removable canister body,

(vi) the lower end of the removable canister body terminating in an opening,

(vii) a connector hose connecting the opening in the lower end of the removable canister body to a suction source hose which in turn is connected to a source of suction, the resistance to fluid flow of the connector hose and the resistance to fluid flow of the opening in the lower of the removable canister body being less than the resistance to fluid flow of the exit hose;

(viii) a double lid, one part of which is placed over the removable canister body after it is filled with debris and before it is removed from the fixed canister body, and the other part inserted into a slot in the fixed canister body to cover the opening of the fixed canister body before the removable canister body is detected;

c. each successive vacuum canister in the series except for the last vacuum canister configured identical to the first vacuum canister, with the respective connector hose leading from the opening at the lower end of each respective removable canister body connected to the same source of suction through the suction source hose; the exit hose of one canister leading to a portion of the vacuum connector hose which is connected to the inlet hose of the next successive canister;

d. a first on-off valve located along the vacuum connector hose adjacent each respective vacuum canister;

e. a second on-off valve located along the inlet hose and exit hose of each respective vacuum canister;

f. the last of said multiplicity of vacuum canisters in the series further comprising:

(i) a fixed canister body including an interior, an upper end and a lower end,

(ii) a removable canister body having an upper end and a lower end, the removable canister body removably connected at its upper end to the lower end of said fixed canister body and in fluid communication therewith,

(iii) an inlet hose connecting a portion of the vacuum connector hose leading from the exit hose of the next to last vacuum canister to the interior of the fixed canister body,

(iv) a filter extending across the interior of the removable canister body,

(v) the lower end of the removable canister body terminating in an opening,

(vi) a connector hose connecting the opening in the lower end of the removable canister body to a suction source hose which in turn is connected to the source of suction, and

(vii) a double lid, one part of which is placed over the removable canister body after it is filled with debris and before it is removed from the fixed canister body, and the other part inserted into a slot in the fixed canister body to cover the opening of the fixed canister body before the removable canister body is detached;

g. whereby all first valves are initially closed and all second valves are initially open and the source of suction generates a greater suction force on the first canister in the series than in the remaining canisters to that the first removable canister is filled with dirt and debris first and the source of suction generates a greater suction force through the opening in the lower end of each removable canister body than through the exit hose in each fixed canister body wherein a greater positive pressure is exerted causing debris to form adjacent and above the filter in each removable canister body while a negative pressure on the filter from the suction through the exit hose serves to remove some particles which are entrapped in the filter and provide it with a longer cleaning life, and at such time as the first removable canister is filled with debris, the first

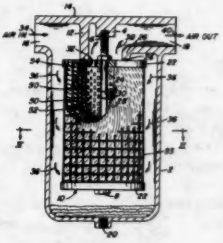
valve adjacent a first vacuum canister is opened and the second valve adjacent the first vacuum canister is closed to close off the inlet hose and exit hose of the first vacuum canister and the removable canister body of the first vacuum canister is removed to discard debris while the vacuum cleaner is still running.

4,976,759

FILTER

Donald R. Foltz, Pittsburgh, Pa., assignor to Hankison Corporation, Canonsburg, Pa.

Filed Jul. 14, 1986, Ser. No. 885,193
Int. Cl.[5] B01D *46/00*
U.S. Cl. 55—487 **12 Claims**



1. A filter for removing solid particles from twenty micron to sub-micron size from a gaseous stream comprising:

surface filtering means having spaced overlying portions which form a first plurality of overlying spaces which overlie a second plurality of overlying spaces,

a first in-depth filtering means located throughout said first plurality of spaces which is of a structure to filter out three microns and larger solid particles from such a stream, and

a second in-depth filtering means located throughout said second plurality of spaces which is of a structure to filter out one micron and larger solid particles and some sub-micron particles from such a stream.

4,976,760

POROUS CERAMIC ARTICLE FOR USE AS A FILTER FOR REMOVING PARTICULATES FROM DIESEL EXHAUST GASES

Richard L. Helferich, Clayton, and Robert C. Schenck, Kettering, both of Ohio, assignors to Cercona, Inc., Dayton, Ohio

Division of Ser. No. 127,784, Dec. 2, 1987, Pat. No. 4,871,495.
This application Sep. 8, 1989, Ser. No. 404,833
The portion of the term of this patent subsequent to Mar. 14, 2006, has been disclaimed.
Int. Cl.[5] B01D *50/00*
U.S. Cl. 55—487 **1 Claim**

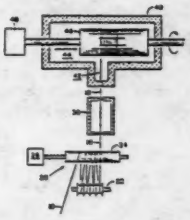
1. An element for filtering solid particulates from a diesel exhaust gas, comprising a shaped porous refractory ceramic body having a predominantly open pore structure and having distinct inlet and outlet surfaces, and where one of said surfaces contains an integral thin porous ceramic membrane layer of open cell porosity, the pores of which have an average diameter smaller than that of the pores at the other surface and the pores throughout the interior of the body, and wherein said porous refractory ceramic body is comprised of a fired porous aluminosilicate hydrogel-bonded ceramic composition.

4,976,761

METHOD FOR MAKING CERAMIC MATRIX COMPOSITE ARTICLE

Roger A. Allaire, Big Flats, N.Y., assignor to Corning, Incorporated, Corning, N.Y.

Filed Aug. 4, 1989, Ser. No. 389,674
Int. Cl.[5] C03B *37/023*; C03C *25/02*
U.S. Cl. 65—3.2 **6 Claims**



1. A method for the manufacture of a composite article which comprises the steps of:

providing a ceramic matrix material in the form of a glass powder;

providing a fibrous reinforcing material comprising one or more inorganic fibers in the form of a continuous fiber strand;

adhering the glass powder to the continuous fiber strand;

transporting the continuous fiber strand with adherent glass power into a hot zone wherein the glass powder is heated to a temperature at least above the annealing temperature of the glass; and

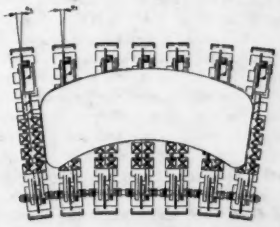
simultaneously collecting and consolidating the strand and adhering glass powder into a dense composite winding on a rotating collection mandrel, wherein the consolidation results solely from the action of a tensional force applied to the fiber strand in a direction opposite to the direction of collection of the fiber strand.

4,976,762

METHOD AND APPARATUS FOR BENDING AND TEMPERING A GLASS SHEET

Kauko K. Anttonen, Tampere, Finland, assignor to Tamglass Oy, Tampere, Finland

Filed Oct. 26, 1989, Ser. No. 426,864
Claims priority, application Finland, Sep. 4, 1989, 894147
Int. Cl.[5] C03B *23/027*
U.S. Cl. 65—107 **30 Claims**



1. A method for bending and tempering a glass sheet comprising the steps of:

heating a glass sheet in a furnace to a tempering temperature,

conveying said glass sheet into a bending and tempering section on a bearing support surface wherein said bearing support surface comprises an upper run of an endless belt conveyor, said endless belt conveyor including a plurality of individual belt strip segments that are pivotally adjust-

able relative to each other such that each of said plurality of individual belt strip segments is inclined relative to an adjacent belt strip segment after pivotal adjustment,

bending the upper run of said endless belt conveyor so as to change said upper run from a substantially flat shape to a shape having a desired curvature wherein said upper run is bent at least around a bending axis extending in a glass sheet advancing direction by pivoting said plurality of individual belt strip segments relative to each other, said bending providing an upper run such that a central region of said upper run is positioned at a level different from a level of at least one side region of said upper fun, and,

blasting at least one of the bottom and top surfaces of said glass sheet carried by the upper belt run with chilling air.

4,976,763

INSTALLATION FOR CURVING AND TEMPERING A SHEET OF GLASS

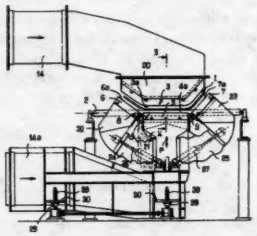
Michel Agius, Santeuil, France, assignor to Selas S.A., Levallois-Perret, France

Filed Mar. 19, 1990, Ser. No. 495,593

Claims priority, application France, Mar. 22, 1989, 89 03760

Int. Cl.[5] C03B *23/02*

U.S. Cl. 65—287 **13 Claims**



1. An installation for curving or bending to convex form and tempering a glass sheet (1) comprising means for heating said sheet, means for bringing said sheet into position between elements (3, 4, 6, 7) which serve to shape said sheet, means for applying said elements on each side of said sheet and for curving this latter and means for sending jets of gas onto the sheet in order to temper this latter, wherein one of the series (3) of elements has a surface (3*a*) which is intended to come into contact with one of the faces of the glass sheet (1) and has a predetermined profile corresponding to the curvature to be given to said sheet, said surface (3*a*) being such as to have a substantially flat portion bordered on at least one side by a section which is inclined at an angle (a) with respect to said flat portion and extends transversely to the direction of displacement of the glass sheet, and wherein the other series of elements (4, 6, 7) which is intended to come into contact with the other face of the glass sheet has a stationary portion (5) corresponding to the substantially flat central portion of the surface (3*a*) of the element (3), at least one movable portion (6 or 7) being attached to said stationary portion and capable of pivoting about a pin (8, 9) which is parallel to the direction of displacement of the glass sheet (1), between a first position and a second position in which said movable portion is inclined at an angle (a) with respect to said stationary portion (5) corresponding to the curvature to be given to the glass sheet.

4,976,764

METHOD OF PRETREATING GLASS PREFORM WITH OXYGEN PLASMA

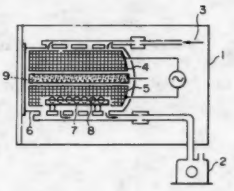
Takuo Fujino, Akishima, Japan, assignor to Hoya Corporation, Tokyo, Japan

Filed Sep. 14, 1989, Ser. No. 407,323

Claims priority, application Japan, Sep. 28, 1988, 63-243229

Int. Cl.[5] C03C *15/00*

U.S. Cl. 65—30.1 **3 Claims**



1. A process for producing a molded glass article by press molding a glass material containing lead oxide, which process comprises the steps of:

(a) subjecting the surface of the glass material to a plasma ashing treatment with activated oxygen, for a period of at least 2.5 minutes, and thereafter

(b) press-molding the glass material at an elevated temperature in a nonoxidizing or reducing atmosphere.

4,976,765

METHOD OF MAKING GLASS-CERAMIC LASER GYROSCOPE FRAME

Mark P. Taylor, Painted Post, N.Y., assignor to Corning Incorporated, Corning, N.Y.

Filed May 15, 1989, Ser. No. 351,715

Int. Cl.[5] C03C *10/00*

U.S. Cl. 65—33 **4 Claims**

1. A method for making ring laser gyroscope frames by sealing individual preformed members into an integral body which comprises the following steps:

(1) forming members of predetermined configuration from glass-ceramics exhibiting a linear coefficient of thermal expansion of less than 1×10^{-7}/°C. within the temperature range of from −50° C. to +100° C., said members consisting essentially, expressed in terms of weight percent on the oxide basis, of

SiO_2	64–67	ZnO	0.7–4.2
Al_2O_3	21–24	TiO_2	2.0–3.25
Li_2O	2.6–3.7	ZrO_2	1.25–2.5
MgO	0.1–1.5	$TiO_2 + ZrO_2$	4–5.25
BaO	0–1	As_2O_3	0–1

(2) applying a coating of a thermally devitrifiable frit consisting essentially, expressed in terms of weight percent on the oxide basis, of 62–68% PbO, 12–20% TiO_2, 12–18% SiO_2, 1–3% Al_2O_3, and 1–3% B_2O_3 onto the surfaces of said members to be sealed together;

(3) bringing the frit coated surfaces of said members into contact with one another;

(4) heating at least the frit coated contacting surfaces of said members to a temperature between about 700°–800° C. for a period of time sufficient to effect a fusion seal between the contacting surfaces, thereby forming an integral body, and to cause the in situ crystallization of lead titanate crystals having a perovskite structure in said seal, such that said seal exhibits a linear coefficient of thermal expansion of less than 30×10^{-7}/°C. within the temperature range of from 0° to 300° C.; and then

(5) cooling the integral body to room temperature.

4,976,766

DEVICE FOR POSITIONING HEATED GLASS SHEETS WITHOUT DEFORMATION

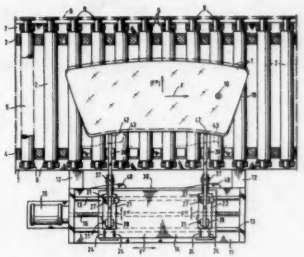
Hans-Werner Kuster, Aachen, Fed. Rep. of Germany, and Luc Vanaschen, Eupen, Belgium, assignors to Saint-Gobain Vitrage International, Courbevoie, France

Filed Nov. 6, 1989, Ser. No. 431,786

Claims priority, application Fed. Rep. of Germany, Nov. 4, 1988, 3837471

Int. Cl.[5] C03B *23/02*

U.S. Cl. 65—289 13 Claims



1. In a substantially horizontal conveyor for conveying heated glass sheet like bodies in a conveying direction, a positioning device for aligning said sheet like bodies in a direction substantially transverse to the conveying direction, comprising:

a carriage positioned laterally of the conveyor;

means for moving said carriage in the conveying direction and in synchronism with a sheet like body on the conveyor;

at least one thrust rod mounted on said carriage for movement in said transverse direction, whereby said at least one thrust rod is advanced into contact the sheet like body on the conveyor; and

means for selectively advancing each said thrust rod into contact with said sheet like body, including:

(a) a cam mounted stationarily with respect to said conveyor, and

(b) a cam follower mounted with respect to said conveyor for movement in the conveying direction together with said thrust rod, said cam follower being mutually positioned such that said cam and said cam follower are engaged during movement of said carriage in said conveying direction, whereby said at least one thrust rod is advanced and aligns said sheet like body.

4,976,767

PLANT FOOD AND METHOD FOR ITS USE

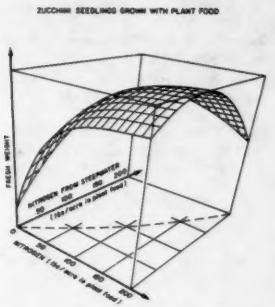
Alan M. Kinnersley, Bedford Park, and Wayne E. Henderson, Lisle, both of Ill., assignors to CPC International Inc., Englewood Cliffs, N.J.

Filed Jan. 29, 1986, Ser. No. 823,857

Int. Cl.[5] C05F *5/00*

U.S. Cl. 71—26 12 Claims

1. An improved plant food for promoting the growth of a plant which comprises a mixture of steepwater and sufficient additional sources of nitrogen, phosphorus, and potassium to give a plant food with a nitrogen:phosphorus:potassium ratio suitable for the growth of said plant, wherein the amount of


ZUCCHINI SEEDLINGS GROWN WITH PLANT FOOD
FRESH WEIGHT
NITROGEN FROM STEEPWATER
(lbs/acre in plant food)
NITROGEN (lbs/acre in plant food)

steepwater present in the mixture is such that at least about 5% of the nitrogen in the mixture comes from the steepwater.

4,976,768

PLANT GROWTH REGULANT

Takeo Motegi; Yasuya Sakuraba; Hiroyuki Iguchi, and Kaoru Kasahara, all of Tokyo, Japan, assignors to Hodogaya Chemical Co., Ltd., Tokyo, Japan

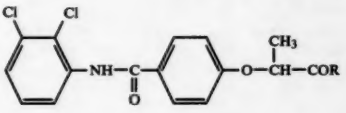
Division of Ser. No. 163,729, Mar. 3, 1988, Pat. No. 4,902,815. This application Nov. 30, 1989, Ser. No. 443,336

Claims priority, application Japan, Mar. 5, 1987, 62-48716

Int. Cl.[5] A01N *37/44, 37/38, 37/18*

U.S. Cl. 71—76 2 Claims

1. A method for regulating plant growth, which comprised applying to said plant a benzamide derivative of the formula:



wherein R is hydroxyl, alkoxy, alkoxyalkoxy, alkoxyalkoxyalkoxy, alkenylalkoxy, alkenylalkoxyalkoxy, alkynylalkoxy, alkynylalkoxyalkoxy, monoalkylamino, dialkylamino or O-cat wherein cat is an inorganic or organic cation.

4,976,769

ACTIVATOR FOR BIOCIDE

Tetsuji Iwasaki, Wakayama, Japan, assignor to Kao Corporation, Tokyo, Japan

Continuation of Ser. No. 42,545, Apr. 24, 1987, abandoned, which is a continuation of Ser. No. 725,028, Apr. 19, 1985, abandoned. This application Oct. 18, 1989, Ser. No. 423,645

Claims priority, application Japan, Apr. 23, 1984, 59-81538

Int. Cl.[5] A01N *57/00, 47/30*

U.S. Cl. 71—86 9 Claims

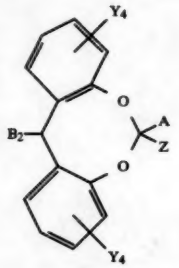
1. An agricultural herbicidal composition which consists essentially of an effective amount of an agricultural chemical herbicide and an effective amount of a substance for increasing the herbicidal rate of said herbicide, said herbicide being 3-(3,4-dichlorophenyl)-1,1-dimethyl urea and said substance being selected from the group consisting of polyoxyalkylene alkyl ether phosphates, a salt thereof, polyoxyalkylene alkenyl ether phosphates and a salt thereof, said substance having from 1 to 22 carbon atoms in the alkyl or alkenyl group thereof, the weight ratio of said substance/said herbicide being in the range of 1/1 to 15/1.

4,976,770
HERBICIDAL AND PLANT GROWTH REGULANT ACTIVITY OF GLYOXYLATES

Keith D. Barnes, Newtown; Frederick W. Hotzman, Morrisville, both of Pa.; Lawrence E. Limpel, Euclid, and Thomas A. Magee, Mentor, both of Ohio, assignors to Fermenta ASC Corporation, Mentor, Ohio

Filed Jun. 29, 1989, Ser. No. 373,210
Int. Cl.[5] A01N *43/24*
U.S. Cl. 71—88 **5 Claims**

1. A method of inhibiting the growth of undesirable vegetation which comprises contacting said vegetation's locus with a herbicidally effective amount of a compound having the formula



wherein:

A is COOR, COSR, $CSNH_2$, CN or, together with one of B, —C(=O)O—;

R is H, Na, K, di(C_1–C_4)alkylammonium, diethanolammonium, C_1–C_8 alkyl, C_1–C_4 alkoxyalkyl, cyclohexyl, tetrahydrofurfuryl or dimethyldioxolanylmethyl;

Z is H or CH_3;

B is H, CH_3 or, together with A, —C(=O)O—;

Y is H, C_1–C_4 alkyl or alkoxy, CF_3 or X; and

X is F, Cl or Br,

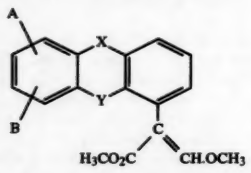
provided that where more than one of Y is other than H on either ring they must be in the 3, 4, 8 and/or 9 positions and, where Y is in the 1, 2, 10 or 11 positions on the rings, no more than one of Y is other than H and that one Y is CH_3.

4,976,771
THIANTHRENES AND PHENOXATHIINS USEFUL AS FUNGICIDES

Vivienne M. Anthony, Maidenhead; John M. Clough, Marlow, and Christopher R. A. Godfrey, Bracknell, all of Great Britain, assignors to Imperial Chemical Industries PLC, London, England

Continuation of Ser. No. 119,485, Nov. 12, 1987, Pat. No. 4,857,545. This application Jun. 12, 1989, Ser. No. 365,015
Claims priority, application Denmark, Nov. 11, 1986, 4792/85; United Kingdom, Dec. 3, 1986, 8628924
Int. Cl.[5] A01N *43/32*; C07D *339/06*
U.S. Cl. 71—90 **5 Claims**

1. A compound having the general formula (I):



(I)

and stereoisomers thereof, wherein X and Y are both sulphur or one is oxygen and the other is sulphur; and A and B, which are the same or different, are hydrogen, halogen, alkyl, alkoxy, phenyl, phenoxy, or benzyloxy, the phenyl rings of any of the foregoing groups being unsubstituted or substituted by one or more of the following: halogen, C_{1-4}alkyl, C_{1-4}alkoxy, halo (C_{1-4})alkyl, cyano and nitro.

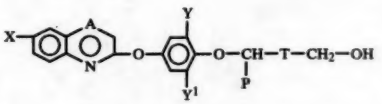
5. A method of combating fungi or regulating plant growth which comprises applying to a plant, to a seed of a plant or to the locus of the plant or seed, a compound according to claim 1.

4,976,772
4-((ARYLOXY)PHENOXY)ALKENOL AS INTERMEDIATES AND HERBICIDES

James A. Turner, Pittsburg; Wendy S. Jacks, Walnut Creek, both of Calif., and Paul S. Zorner, Durham, N.C., assignors to The Dow Chemical Company, Midland, Mich.

Division of Ser. No. 901,844, Aug. 29, 1986, Pat. No. 4,900,354. This application Nov. 13, 1989, Ser. No. 435,095
Int. Cl.[5] C07D *241/44*; A01N *43/60*
U.S. Cl. 71—92 **33 Claims**

1. A compound or an optical isomer thereof corresponding to the formula



wherein

Y and Y^1 each independently represent —H or —F;

P represents methyl or ethyl;

T represents $(CH_2—CH_2)_a(CH=CH)_b$ and the cis (Z) or trans (E) stereoisomers thereof or $(CH_2—CH_2)_a(CH=C)$;

A represents =N;

a represents the integer 0, 1 or 2;

b represents the integer 1 or 2; and

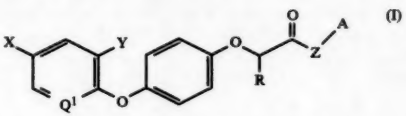
X represents —Br, —Cl, —F or —CF_3.

4,976,773
HERBICIDALLY ACTIVE PHENOXYALKANECARBOXYLIC ACID DERIVATIVES

Harukazu Fukami, Kyoto; Naoki Higuchi, Ikeda; Naoko Kawaguchi, Moriguchi; Masaki Hashimoto, Ibaraki; Kinya Ide, Kusatsu, and Toshio Takahashi, Nishinomiya, all of Japan, assignors to Suntory Limited, Osaka, Japan

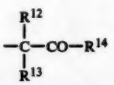
Filed Aug. 10, 1988, Ser. No. 230,481
Claims priority, application Japan, Aug. 11, 1987, 62-199040; Aug. 11, 1987, 62-199041; Oct. 23, 1987, 62-266563; Jan. 4, 1988, 63-000010
Int. Cl.[5] C07D *213/64*; A01N *43/40*
U.S. Cl. 71—94 **3 Claims**

1. A compound of the formula:



(I)

wherein Q^1 is N; R is H or C_1–C_5 alkyl; X is H, halogen, CF_3, or NO_2; Y is H or halogen; Z is —O—; A is



wherein R^{12} and R^{13} are each H or C_1–C_5 alkyl; R^{14} is C_1–C_5

alkyl, C_2–C_6 alkenyl, C_6–C_{10} aryl, or C_7–C_{15} aralkyl; or R^{13} and R^{14} taken together form C_3–C_4 alkylene; or a salt thereof.

3. A herbicidal composition comprising (i) a herbicidally effective amount of a compound according to claim 1 as an effective ingredient and (ii) a herbicidally acceptable carrier.

4,976,774

1-(4'-PYRIDYL)-4-PYRIDONE, ITS DERIVATIVES AND HERBICIDAL USE THEREOF

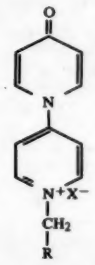
Bruno M. Vittimberga, Kingston, R.I., assignor to The Board of Governors for Higher Education, State of Rhode Island and Providence Plantations, Providence, R.I.

Continuation of Ser. No. 632,809, Jul. 20, 1984, abandoned. This application Aug. 2, 1988, Ser. No. 241,811

Int. Cl.[5] A01N *43/40, 43/84;* **C07D** *401/04, 413/14*

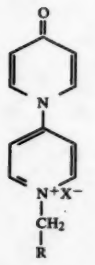
U.S. Cl. 71—94 **18 Claims**

1. A compound selected from the group consisting of pyridyl pyridones and their salts having a bipyridylium component of the formula



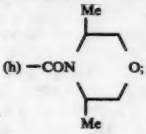
wherein R is selected from the group consisting of hydrogen; alkyl of 1–20 carbons atoms; phenyl; alkyloxy of up to 4 carbon atoms; phenoxy; halogen; nitro; perhaloalkyl; alkoxyalkyl of up to 6 carbon atoms; alkoxyalkoxy of up to 6 carbon atoms; amino, alkyl or dialkyl amino of up to 4 carbon atoms in each alkyl substituent; cyano; carbalkoxy of up to 4 carbon atoms in the alkoxy moiety; carbamoyl, alkyl or dialkyl carbamoyl of up to 4 carbon atoms in each alkyl substituent; sulfo group; sulfonamido; alkylcarbonyl or carboxyalkyl of up to 4 carbon atoms in the alkyl moiety; alkanoyloxy of up to 4 carbon atoms; haloalkyl of up to 4 carbon atoms; alkanoylamido of up to 4 carbon atoms; alkylthio of up to 4 carbon atoms; alkylsulfinyl of up to 4 carbon atoms; and alkylsulfonyl of up to 4 carbon atoms; and wherein R is an electron-withdrawing group which is sufficiently strong to reduce the half-cell potential of said compound and wherein X^- is a mono- or polyvalent anion.

3. A compound selected from the group consisting of pyridyl pyridones and their salts having a bipyridylium component of the formula

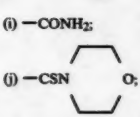


where R is selected from the group consisting of

(a) —Me;
(b) —H
(c) —CH=CH_2
(d) —CH_2OH;
(e) —Ph
(f)—CH=CHCOOMe;
(g) —COMe



(h) —CON O;



(i) —$CONH_2$;

(j) —CSN O;

(k) —CH=CHCN;
(l) —COOEt;
(m) —CSNHPh;
(n) —CN;
(o) —OMe;
(p) —NH_2;
(q) —Cl;
(r) —CH_2Ph;
(s) —CH_2CN;
(t) —OH;
(u) —CCl_3;
(v) —CF_3;
(w) —$CH(CN)_2$;
(x) —CH_2CF_3;

12. A process for killing unwanted living plants, which comprises contacting the leaves and stems of such plants with a herbicidally effective amount of a phytotoxic compound according to claim 1.

4,976,775

PLANT MALE STERILANT

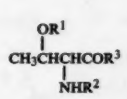
Masaharu Sakaki, Toyonaka, and Hiroko Yamazaki, Osaka, both of Japan, assignors to Sumitomo Chemical Company, Limited, Osaka, Japan

Filed Mar. 3, 1989, Ser. No. 318,203

Int. Cl.[5] A01N *37/20, 37/18, 33/26, 33/04, 33/08, 33/02*

U.S. Cl. 71—106 **14 Claims**

1. A plant male sterilant which comprises as an active ingredient an effective amount of a threonine derivative having the formula (I):



(I)

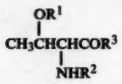
wherein R^1 is a C_1 to C_2 alkyl group; R^2 is a hydrogen atom, a C_1 to C_3 alkyl group or a group having the formula: COR^4 in which R^4 is a C_1 to C_4 alkyl group, a C_1 to C_3 alkoxy group, a phenyl group, an amino group or a C_1 to C_3 alkylamino group; R^3 is a hydroxy group, a C_1 to C_4 alkoxy group or a group having the formula: NHR^5 in which R^5 is a hydrogen atom, a hydroxy group, a C_1 to C_3 alkyl group, an amino group or a C_1 to C_3 alkylamino group and an inert carrier or diluent.

6. A plant male sterilant which comprises an effective amount of L-O-methylthreonine as an active ingredient and an inert carrier or diluent.

7. A plant male sterilant which comprises an effective amount of L-N-benzoyl-O-methylthreonine as an active ingredient and an inert carrier or diluent.

8. A plant male sterilant which comprises an effective amount of L-N-ethoxycarbonyl-O-methylthreonine as an active ingredient and an inert carrier or diluent.

14. A method for producing hybrid seeds of the first filial generation, which comprises applying an effective amount of a threonine derivative having the formula (I):



(I)

wherein R^1 is a C_1 to C_2 alkyl group; R^2 is a hydrogen atom, a C_1 to C_3 alkyl group or a group having the formula: COR^4 is which R^4 is a C_1 to C_4 alkyl group, a C_1 to C_3 alkoxy group, a phenyl group, an amino group or a C_1 to C_3 alkylamino group; R^3 is a hydroxy group, a C_1 to C_4 alkoxy group or a group having the formula: NHR^5 in which R^5 is a hydrogen atom, a hydroxy group, a C_1 to C_3 alkyl group, an amino group or a C_1 to C_3 alkylamino group and an inert carrier or diluent to a female plant, and pollinating the female plant with pollens from a male plant.

4,976,776

METHOD FOR REDUCTION OF MATERIAL CONTAINING METAL OXIDE USING A FLUIDIZED BED REACTOR AND FLAME CHAMBER

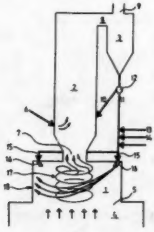
Hans I. Elvander, Helsingborg, Sweden, and Rolf E. Malmström, Helsingfors, Finland, assignors to A. Ahlstrom Corporation, Noormarkku, Finland

Filed Mar. 15, 1989, Ser. No. 323,922

Claims priority, application Finland, Mar. 30, 1988, 881486; Jun. 22, 1988, 882975

Int. Cl.[5] C22B *1/10, 5/14*

U.S. Cl. 75—483 **19 Claims**



1. A method for preheating and pre-reducing metal oxide containing material to produce a pre-reduced product suitable for final reduction, using a fluidized bed reactor having a lower portion open to a flame chamber which is open to a final reduction stage, comprising the steps of:

(i) feeding the metal oxide containing material into a fluidized bed reactor;

(ii) feeding hot exhaust gases from the flame chamber into the lower portion of the fluidized bed reactor for fluidizing and preheating the metal oxide containing material in the fluidized bed reactor;

(iii) separating the preheated metal oxide containing material from the exhaust gases emerging from the fluidized bed reactor;

(iv) effecting at least partial smelting and/or pre-reduction of the preheated metal oxide containing material by utilizing hot reducing gases from the final reduction stage;

(v) recirculating a portion of the separated metal oxide containing material back into the fluidized bed reactor, and feeding the remainder into the flame chamber with a rotating movement to effect at least partial smelting and pre-reduction of the metal oxide containing material in the flame chamber; and

(vi) after preheating and pre-reduction, moving the metal oxide containing material downwardly to a final reduction stage.

4,976,777

METAL POWDER HAVING CONTROLLED PARTICLE SIZE DISTRIBUTION FOR METALLIC PIGMENTS AND PROCESS FOR PRODUCING THE SAME

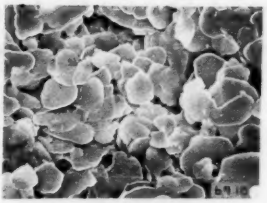
Sinya Ozawa; Katsumi Kondo, and Kajin Saito, all of Nara, Japan, assignors to Showa Alumi Powder Kabushiki Kaisha, Nara, Japan

Filed Sep. 11, 1989, Ser. No. 406,388

Claims priority, application Japan, Sep. 9, 1988, 63-226197

Int. Cl.[5] B22F *1/00*

U.S. Cl. 75—255 **3 Claims**



1. Graded metal powder for metallic pigment, comprising a metal powder wherein said metal powder has a mean particle size of from about 2.5 to about 15.0 μm, the content of particles having a particle size of not greater than 1 μm is not more than about 0.5% by volume, and said metal powder has a particle size distribution such that not less than 97% by volume of the particles of said metal powder fall within the range between half the mean particle size of said metal powder and double the mean particle size of said metal powder.

4,976,778

INFILTRATED POWDER METAL PART AND METHOD FOR MAKING SAME

David F. Berry, Westlake; Erhard Klar, Beachwood, and Mark Svilar, Orange, all of Ohio, assignors to SCM Metal Products, Inc., Cleveland, Ohio

Continuation-in-part of Ser. No. 165,587, Mar. 8, 1988, Pat. No. 4,861,373. This application Jun. 23, 1988, Ser. No. 210,579

Int. Cl.[5] B22F *1/00*

U.S. Cl. 75—254 **6 Claims**

1. A process not necessitating solvent extraction of binder for making an infiltrated ferrous powder metal part which comprises the steps of:

(a) mixing a metal powder with a binder to produce a binder-powder mix;

(b) pressing said binder-powder mix into a compact;

(c) sintering said compact; and

(d) infiltrating said sintered compact.

4,976,779

OXYGEN-CONTAINING MOLYBDENUM METAL POWDER AND PROCESSES FOR ITS PREPARATION

Theodor A. Webwer, Goslar-Jerstedt, and Wolfgang Kummer, Goslar, both of Fed. Rep. of Germany, assignors to Bayer Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

Filed Oct. 27, 1989, Ser. No. 427,582

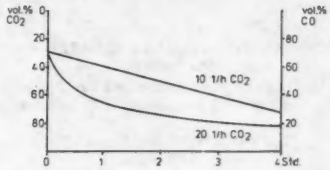
Claims priority, application Fed. Rep. of Germany, Nov. 8, 1988, 3837782

Int. Cl.[5] C23C *8/16*

U.S. Cl. 75—363 **3 Claims**

1. Process for the preparation of molybdenum metal powder

particles having a molybdenum oxide shell which consists essentially of MoO_2 wherein molybdenum metal powder is



partly oxidized by thermal treatment in a carbon dioxide atmosphere at temperatures below 1.200° C.

4,976,780

BLAST FURNACE OPERATION MANAGEMENT METHOD AND APPARATUS

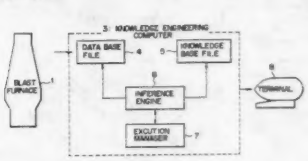
Shigeru Amano; Tsuyoshi Takarabe; Hiroshi Oda; Takashi Nakamori; Satoshi Watanabe, and Masamichi Taira, all of Kimitsu, Japan, assignors to Nippon Steel Corporation, Tokyo, Japan

Filed Dec. 14, 1989, Ser. No. 450,390

Claims priority, application Japan, Dec. 20, 1988, 63-321653; Dec. 20, 1988, 63-321654; Jan. 6, 1989, 64-886; Jan. 6, 1989, 64-887; Jan. 24, 1989, 1-14623

Int. Cl.[5] C21B *7/24*

U.S. Cl. 75—375 23 Claims



1. A method for management of an operation of a blast furnace comprising the steps of:

preparing a data base including information related to said blast furnace and a knowledge base including rules for diagnosing the state of said blast furnace,

gathering said information in a first interval,

renewing said data base by using said gathered information, and

inferring the state of said blast furnace using said data base and said knowledge base in a second interval longer than said first interval, characterized in that the method further comprises the steps of:

watching parameters related to said blast furnace to detect a remarkable change in the parameters, and

additionally initiating said inference step when a remarkable change in the parameters is detected in said watching step.

4,976,781

MINERAL RECOVERY PROCESS

David Mainwaring, North Balwyn, and Mark Cadzow, North Fitzroy, both of Australia, assignors to Charlton Mineral Associates Pty. Ltd., Victoria, Australia

Filed Aug. 21, 1987, Ser. No. 88,054

Claims priority, application Australia, Aug. 21, 1986, PH7589

Int. Cl.[5] C22B *11/00*

U.S. Cl. 75—710 8 Claims

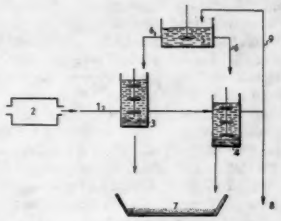
1. A method of recovering noble metal or diemond values from an ore comprising:

forming a slurry of the ore,

adding to said slurry in a contacting zone pellets preformed from a carbonaceous material, a hydrocarbon liquid, and a secondary solid binder,

said secondary solid binder selected to form plastically deformable pellets of sufficient strength to withstand high shear forces present in said contacting zone without substantial attrition,

said hydrocarbon liquid selected for optimal collection of said noble metal or diamond values while maintaining



pellet sizes and numbers in substantially stable distribution;

agitating the slurry and pellet mixture in said contacting zone to produce continuous contacting between the ore and pellets, and

removing pellets from said contacting zone and recovering noble metal or diamonds which have become associated principally by preferential surface wetting with said pellets in said contacting zone.

4,976,782

WATER-BASED WOOD STAIN

Vera W. Crozer, 19 Rockwood La., Greenwich, Conn. 06830

Filed Mar. 27, 1989, Ser. No. 329,017

Int. Cl.[5] C09D *15/00*

U.S. Cl. 106—19 12 Claims

1. A composition for use as a wood stain comprising water, a glycol, mineral oil and a flexographic printing ink, comprising an alkaline solution of an acidic resin and at least one pigment dispersed in said resin, wherein said water, glycol, mineral oil and flexographic printing ink are present in about equal proportions by weight.

4,976,783

MODIFIED CYCLOPENTADIENE RESIN, PROCESSES FOR ITS PREPARATION, AND ITS USE

Gerhard Werner, Glashütten/Taunus, Fed. Rep. of Germany, assignor to Hoechst AG, Fed. Rep. of Germany

Continuation of Ser. No. 902,300, Sep. 29, 1986, abandoned. This application Nov. 28, 1988, Ser. No. 276,891

Claims priority, application Fed. Rep. of Germany, Aug. 31, 1985, 3531242

Int. Cl.[5] C09D *11/00*; C08L *6/00*

U.S. Cl. 106—20 15 Claims

1. A process for the preparation of a modified cyclopentadiene resin, wherein the mixture of (a) 55 to 80% by weight of monomeric or oligomeric cyclopentadiene and/or its alkyl-substitution products and/or its oligomers which are liquid at room temperature and which are not yet resinous are thermally polymerized with (b) 3 to 16% by weight of resols, (c) 5 to 45% by weight of non-aromatic, unsaturated monocarboxylic fatty acids or natural resin acids having 8 to 26 carbon atoms, (d) 0.5 to 10% by weight of α,β-olefinic, unsaturated dicarboxylic acid units, (e) 3 to 7% by weight of other copolymerizable monomers and/or (f) 0.5 to 1.5% by weight of a metal compound from the groups IIa, IIb or IIIa of the periodic system, the sum of the components (a) to (f) always being 100% by weight, at a temperature of 230° to 290° in one stage.

4,976,784

CATIONIC SLURRY SEAL EMULSIFIERS

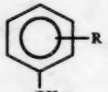
Peter Schilling, Charleston, S.C., assignor to Westvaco Corporation, New York, N.Y.

Division of Ser. No. 334,464, Apr. 7, 1989, abandoned. This application Aug. 28, 1989, Ser. No. 399,248

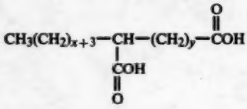
Int. Cl.[5] C08L 95/00

U.S. Cl. 106—277 9 Claims

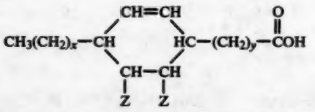
1. A paving slurry seal mixture of an aqueous bituminous emulsion and mineral aggregate capable of being worked comprising: a densely graded mineral aggregate passing through No. 4 and at least 80% retained on 200 mesh screen; from about 8% to about 20% of an oil in water type emulsion, based on the weight of the mineral aggregate, wherein the emulsion is comprised of from about 60% to about 70% bitumen, based on the weight of the emulsion, from about 0.5% to about 2% of a cationic emulsifier based on the weight of the emulsion, and water to make up 100% by weight of the emulsion; from about 4% to about 16% water, based on the weight of the mineral aggregate, added to form a slurry of the aggregate and the emulsion; wherein the emulsifier is the reaction product of (a) an alkyl phenol of the form



where R represents a linear or branched alkyl group, (b) an aldehyde, and, (c) the reaction product of a polyamine and a compound selected from the group of a tall oil fatty acid, a polycarboxylic acid corresponding to the formula



and a polycarboxylic acid corresponding to the formula



wherein x and y are integers from 3 to 9, x and y together equal 12, at least one Z is a carboxylic acid group and any remaining Z is hydrogen.

4,976,785

PAINT RESIN

Shinji Nakano, Takatsuki; Koichi Tsutsui, Tsuzuki; Shoji Ikeda, Hirakata, and Yoji Hirasawa, Soraku, all of Japan, assignors to Nippon Paint Co., Ltd., Osaka, Japan

Continuation of Ser. No. 116,679, Nov. 3, 1987, abandoned. This application Feb. 14, 1989, Ser. No. 309,894

Claims priority, application Japan, Nov. 6, 1986, 61-265136

Int. Cl.[5] C08L 93/00

U.S. Cl. 106—287.17 12 Claims

1. A resin for dispersing a pigment prepared by reacting an aluminum chelate compound with a resin having an active hydrogen bonded to an electrophilic atom or atomic group which is selected from the group consisting of a polyester resin, an alkyd resin, an acrylic resin, a polyamide resin, a melamine resin, a urea resin and a polyurethane resin, said reaction producing a resin chemically modified with said aluminum chelate compound, which modified resin is capable of dispersing a pigment added thereto and producing a coating having high gloss characteristics.

4,976,786

METHOD FOR FORMING AGGREGATED KAOLIN PIGMENT

Weyman H. Dunaway, Sandersville, and Lev F. Verbov, Milledgeville, both of Ga., assignors to ECC America Inc., Atlanta, Ga.

Filed Oct. 4, 1989, Ser. No. 416,936

Int. Cl.[5] C04B 14/10

U.S. Cl. 106—416 24 Claims

1. A method for forming a hydrothermally aggregated kaolin clay pigment, comprising: preparing an aqueous slurry of particulate kaolin clay and sodium aluminate, having a total solids concentration of from about 2 to 25% by weight, the weight ratio between the particulate kaolin clay and the sodium aluminate being greater than 1; and hydrothermally treating said slurry in a closed system to form aggregates of adherent kaolin platelets.

4,976,787

PIGMENT

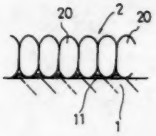
Hiroshi Ito, Ichinomiya; Junichi Handa, Toyota; Yoshio Takagi, Nagoya, and Taketoshi Minohara, Toyota, all of Japan, assignors to Toyota Jidosha Kabushiki Kaisha, Japan

Division of Ser. No. 306,980, Feb. 7, 1989. This application Mar. 14, 1990, Ser. No. 493,348

Claims priority, application Japan, Jul. 20, 1988, 63-181215; Jan. 25, 1989, 1-15385

Int. Cl.[5] C09C 1/00

U.S. Cl. 106—441 4 Claims



1. A method for forming a pigment which produces interference color, comprising the steps of:

plating pearl mica comprising mica with a titanium dioxide layer formed on all surfaces of said mica with a chromium compound, and

plating said chrome-plated pearl mica with a metal ar an alloy by electroless plating,

whereby a metallic layer is formed in a scattered manner on an interface between said mica and said titanium dioxide, said metallic layer being formed in gaps between particles of said titanium dioxide and around said titanium dioxide.

4,976,788

METHOD OF CLEANING MELT-PROCESSING EQUIPMENT WITH A THERMOPLASTIC POLYOLEFIN AND A BIFUNCTIONAL SILOXANE

Ronald S. Nohr, Roswell, and J. Gavin MacDonald, Decatur, both of Ga., assignors to Kimberly-Clark Corporation, Neenah, Wis.

Continuation-in-part of Ser. No. 202,275, Jun. 3, 1988, abandoned. This application Feb. 6, 1990, Ser. No. 475,568

Int. Cl.[5] B08B 7/00; B28B 7/04; C11D 7/26, 7/60

U.S. Cl. 134—5 15 Claims

1. A method of cleaning melt-processing equipment which comprises processing in such equipment a thermoplastic composition which comprises at least one thermoplastic polyolefin

and at least one siloxane-containing additive having at least two moieties, A and B, in which:

(A) said additive is compatible with said polyolefin at melt extrusion temperatures but is incompatible at temperatures below melt extrusion temperatures, but each of moiety A and moiety B, if present as separate compounds, would be incompatible with said polyolefin at melt extrusion temperatures and at temperatures below melt extrusion temperatures;

(B) moiety A contains at least one tetrasubstituted disiloxanylene group;

(C) moiety B has at least one functional group which is a poly(oxyalkylene) moiety;

(D) the molecular weight of said additive is in the range of from about 400 to about 16,000; and

(E) said additive is present in said thermoplastic composition at a level of from about 3 to about 12 percent by weight, based on the weight of said thermoplastic polyolefin;

in which (1) said at least one thermoplastic polyolefin is not the same polymer as last employed in the melt-processing equipment to be cleaned, and (2) the amount of thermoplastic composition and the processing time are sufficient to clean said processing equipment.

4,976,789

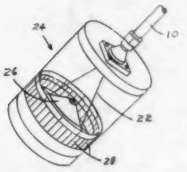
POWER TRANSMISSION DEVICE

Miles E. Holloman, Decatur; Debbee J. Jordan, and William F. Otto, both of Huntsville, all of Ala., assignors to The United States of America as represented by the Secretary of the Army, Washington, D.C.

Filed Dec. 26, 1989, Ser. No. 456,899

Int. Cl.[5] H01L *31/052*

U.S. Cl. 136—246 **9 Claims**



1. A power transmission device for transmitting electrical power optically, comprising:

(a) a laser for generating a laser light beam;

(b) an optical glass monofilament having a glass core with a predetermined refractive index and a cladding outer layer having a different refractive index for conveying light beams;

(c) means for directing said laser beam into a receiving end of said monofilament at a predetermined angle to longitudinal axis of said monofilament, whereby said laser beam is transmitted to an exit of said monofilament, exits therefrom in a uniform conical annulus at the same angle to the longitudinal axis of said monofilament as said laser beam was directed into said receiving end;

(d) a conical reflector disposed with its apex inside of said conical annulus and with its base disposed outside of said conical annulus to intercept and reflect light beams in said conical annulus along a path outwardly of said reflector at an angle to the longitudinal axis of said conical reflector; and

(e) a plurality of photovoltaic cells disposed in a ring about said conical reflector, having inner surfaces extending in a path to intercept said reflected light beams uniformly to generate electric current therefrom.

4,976,790

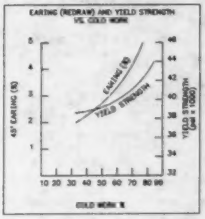
PROCESS FOR PREPARING LOW EARING ALUMINUM ALLOY STRIP

Donald C. McAuliffe, Golden, and Ivan M. Marsh, Denver, both of Colo., assignors to Golden Aluminum Company, Lakewood, Colo.

Filed Feb. 24, 1989, Ser. No. 315,408

Int. Cl.[5] C22F *1/04*

U.S. Cl. 148—2 **16 Claims**



1. A method for producing aluminum alloy strip stock suitable for drawing and ironing and having reduced earing in which aluminum alloy melt is continuously cast in strip form in a caster, the improvement comprising:

(a) introducing said aluminum alloy strip from said caster said strip having a first thickness into hot rolls at a strip temperature of between about 880° F. and 1,000° F;

(b) hot rolling said strip to reduce the thickness of said strip by at least about 70% and provide a hot-rolled strip having a second thickness;

(c) recovering said hot-rolled strip from said hot rolls at a temperature no greater than about 650° F.;

(d) cold rolling said hot-rolled strip recovered in step (c) to provide a cold-rolled strip having a third thickness;

(e) annealing said cold-rolled strip at an intermediate annealing temperature to provide an annealed strip; and

(f) subjecting said annealed strip to further cold rolling sufficient to optimize the balance between the 45° earing and yield strength and provide a strip having a fourth thickness.

4,976,791

HEAT RESISTANT SINGLE CRYSTAL NICKEL-BASE SUPER ALLOY

Takehiro Ohno, and Rikizo Watanabe, both of Yasugi, Japan, assignors to Hitachi Metals, Ltd., Japan

Continuation of Ser. No. 349,210, May 9, 1989, abandoned. This application Jan. 19, 1990, Ser. No. 469,740

Claims priority, application Japan, May 17, 1988, 63-120023; Feb. 9, 1989, 1-30172

Int. Cl.[5] C22C *19/05*

U.S. Cl. 148—404 **6 Claims**

1. A heat resistant single-crystal nickel-base superalloy consisting of by weight 4–9% chromium, 4–6.5% aluminum, 5–8.5% tungsten, 5–8.5% tantalum, the amount of tungsten and tantalum being less than 16%, 3–6% molybdenum, 0.01–0.30% hafnium, 0.01–4%, cobalt, and the balance nickel and incidental elements.

4,976,792

ELECTRIC CONDUCTOR AND METHOD OF MANUFACTURING SAME

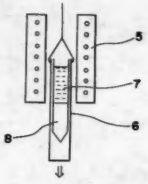
Kazuo Sawada, Osaka, Japan, assignor to Sumitomo Electric Industries, Ltd., Osaka, Japan

Continuation of Ser. No. 295,004, Jan. 9, 1989, abandoned, which is a continuation of Ser. No. 170,092, Mar. 9, 1988, abandoned, which is a continuation of Ser. No. 818,751, Jan. 14, 1986, abandoned. This application Oct. 25, 1989, Ser. No. 427,956

Claims priority, application Japan, Jan. 14, 1985, 60-4336; Jan. 14, 1985, 60-4337

Int. Cl.[5] C22C *9/00*

U.S. Cl. 148—404 **6 Claims**



1. An electric wire for connecting audio appliances, comprising an elongated member composed of one single crystal of copper of not less than 99.99% in purity such that the single crystal extends throughout the elongated member in a longitudinal direction of the elongated member.

4,976,793

EXPLOSIVE COMPOSITION

Leon M. Zimmermann, Johannesburg, South Africa, assignor to Dantex Explosives (Proprietary) Limited, South Africa

Filed Jun. 12, 1990, Ser. No. 536,707

Int. Cl.[5] C06G *45/02*

U.S. Cl. 149—21 **8 Claims**

1. A permitted water-bearing explosive composition of the watergel or emulsion type is characterized in that it contains a suitable amount of a non-passivated paint flake aluminium having a surface area of 5000 cm^2/g or greater and no other aluminium and a suitable amount of one or more alkali or alkaline earth metal or ammonium halides.

4,976,794

THERMOPLASTIC ELASTOMER-BASED LOW VULNERABILITY AMMUNITION GUN PROPELLANTS

Richard A. Biddle, Elkton, Md., and Rodney L. Willer, Newark, Del., assignors to Morton Thiokol Inc., Chicago, Ill.

Filed Aug. 5, 1988, Ser. No. 229,032

Int. Cl.[5] C06B *45/10*

U.S. Cl. 149—19.5 **9 Claims**

1. A low vulnerability ammunition gun propellant composition comprising from about 60 to 85 wt. percent of particulates of a high-energy oxidizer and between about 15 wt. percent and about 40 wt. percent of a thermoplastic, elastomeric binder system, said binder system being substantially free of metallic particulates and materials which leave a solid residue, said binder system comprising a non-cross-linked, thermoplastic, elastomeric polymer in which at least one pair of crystalline A blocks flanks at least one amorphous B block and from 0 to about 80 wt. percent of a plasticizer, wherein said non-cross-linked, elastomeric polymer comprises crystalline polyester A blocks and an amorphous polyester B block.

4,976,795

SOLID GAS-GENERATING COMPOSITION AND ITS USE IN GAS GENERATORS FOR INFLATABLE CUSHIONS INTENDED TO PROTECT THE PASSENGERS OF A MOTOR VEHICLE

Christian Perotto, Ballancourt, France, assignor to S.N.C. Livbag, Vert Le Petit, France

Filed Jun. 4, 1990, Ser. No. 533,178

Claims priority, application France, Jun. 21, 1989, 89 08224

Int. Cl.[5] C06B *45/10*

U.S. Cl. 149—19.4 **12 Claims**

1. Solid composition generating nontoxic gases, comprising molybdenum sulphide and an alkali or alkaline-earth metal azide, characterized in that it contains between 3% and 6% by weight relative to the total weight of the said composition of a binder consisting of the product of reaction of a polyglycidyl azide containing hydroxyl ends with at least one polyisocyanate chosen from the group consisting of diisocyanates and triisocyanates.

4,976,796

METHOD FOR ELECTRICALLY AND MECHANICALLY CONNECTING THE ENDS OF TWO JACKETED ELECTRICAL CONDUCTORS TO EACH OTHER

Ernst Feitzelmayer, Munich, Fed. Rep. of Germany, assignor to MTU Motoren-Und Turbinen Union Muenchen GmbH, Munich, Fed. Rep. of Germany

Filed Nov. 8, 1988, Ser. No. 268,576

Claims priority, application Fed. Rep. of Germany, Nov. 12, 1987, 3738440

Int. Cl.[5] B21F *15/02*

U.S. Cl. 156—49 **14 Claims**

1. A method for splicing to each other insulation free ends of insulated electrical conductors each protruding from a jacket end or a respective metal jacket enclosing said insulated electrical conductors and for protecting the splice against high temperatures up to at least 900° C., comprising the following sequences of steps:

(a) providing at least one through bore in a ceramic insert, said through bore having a cross-section sufficient for holding at least two of said insulation free conductor ends in said one through bore,

(b) aligning with said through bore at least two insulation free conductor ends having the same polarity,

(c) threading said two insulation free conductor ends having the same polarity through said at least one through bore of said ceramic insert so that said two insulation free conductor ends protrude out of the same through bore with an overlap,

(d) local welding or brazing said insulation free conductor ends at said overlap to each other, so that conductor ends

of the same polarity are electrically and mechanically connected to each other in a high temperature resistant manner,

(e) sliding a metal cover sleeve onto said ceramic insert so that said metal cover sleeve surrounds both of said metal jacket ends of said electrical conductors and said ceramic insert, thereby also covering said ceramic insert and said locally connected overlap, whereby said ceramic insert supports and spaces said insulation free conductor ends in and from said metal cover sleeve, and

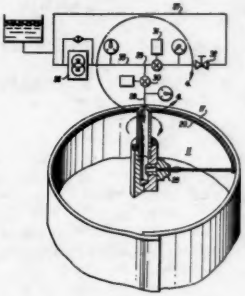
(f) brazing said metal cover sleeve directly or indirectly to both of said metal jacket ends to form a hermetic seal between said cover sleeve and both of said metal jacket ends.

4,976,797

PAPERBOARD CANNISTER FABRICATION METHOD AND APPARATUS

Barry G. Calvert, Covington, and Dan D. Diedrich, Roanoke, both of Va., assignors to Westvaco Corporation, New York, N.Y.

Filed Nov. 1, 1989, Ser. No. 430,172
Int. Cl.[5] B32B *31/00*
U.S. Cl. 156—69 3 Claims



1. A cannister end capping apparatus having a fluidized adhesive delivery system comprising positive displacement adhesive pumping means and circulation conduit means for receiving fluid discharge from said pumping means, spur conduit means junctioned with said circulation conduit means terminated by adhesive delivery jet nozzle means, said spur conduit means including a first, rapid response solenoid valve means between said junction and said jet nozzle means, said circulation conduit means including a second, rapid response solenoid valve means and manually adjustable, variable flow area means downstream of said junction, said solenoid valves being simultaneously functional to opposite flow control states.

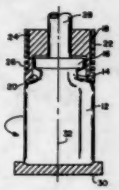
2. A cannister end capping apparatus having a fluidized adhesive delivery system comprising positive displacement adhesive pumping means and circulation conduit means for receiving fluid discharge from said pumping means, spur conduit means terminated by adhesive delivery jet nozzle means, solenoid operated two-way valve means connecting said spur conduit means with said circulation conduit means and manually adjustable, variable flow area means in said circulation conduit means downstream of said two-way valve means.

4,976,798

METHOD OF APPLYING A PLASTIC WRAP TO A CONTOURED CONTAINER

Wolfgang W. Hoffman, Modesto, Calif., assignor to Shibuya America Corporation, Modesto, Calif.

Filed Jan. 12, 1990, Ser. No. 464,319
Int. Cl.[5] B32B *31/26*
U.S. Cl. 156—85 10 Claims



1. The method of applying a wrap of a plastic sheet material to a contoured container of a small diameter at one end increasing to a relatively large diameter cylindrical portion spaced from said one end comprising the steps of:

providing a mandrel sleeve with an inner surface of a size and shape to be received over said one end of the container to a level close to said large diameter portion and a cylindrical outer surface of said large diameter portion;

there being a plurality of vacuum passageways in the wall of said mandrel sleeve opening on the cylindrical surface thereof;

positioning said container on a rotatable chuck with said one end up;

lowering said mandrel sleeve over said one end of the container;

cutting a length of heat shrinkable sheet material long enough to encircle said large diameter portion with overlapped edges;

applying a solvent of said plastic sheet material to the trailing edge of said length;

wrapping said length of said sheet material around both said sleeve and the large diameter portion of said container so that the trailing edge overlaps the leading edge thereof;

withdrawing said mandrel sleeve from within said wrapped length; and

applying heat to said length of sheet material to shrink it tightly around said container.

4,976,799

METHOD OF PREPARING LAMINATED HOLOGRAMS

Glenn P. Wood, Altrincham, United Kingdom, assignor to Ilford Limited, Knutsford, England

Filed Dec. 8, 1989, Ser. No. 448,003
Claims priority, application United Kingdom, Dec. 20, 1988, 8829643
Int. Cl.[5] B32B *31/20, 17/10*
U.S. Cl. 156—106 6 Claims

1. A method of preparing a laminated hologram wherein a silver halide hologram is laminated between two sheets of glass, comprising the steps:

forming an assembly which comprises a first sheet of glass, a first sheet of polyvinyl butyral, a translucent film which contains the silver halide hologram, a second sheet of polyvinyl butyral and a second sheet of glass, wherein only the translucent film containing the silver halide hologram is sandwiched between the first and second sheets of polyvinyl butyral, and

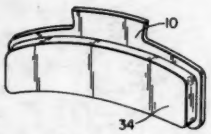
subjecting the assembly to a pressure of between 12 and 15 bars at a temperature above the softening temperature of the first and second sheets of polyvinyl butyral.

4,976,800

METHOD OF BONDING FRICTION MATERIAL TO PLATED SUBSTRATES

Keith R. Edwards, Lindsay, Canada, assignor to Abex Corporation, Newton, Mass.

Filed May 5, 1989, Ser. No. 348,045
Int. Cl.[5] B32B *31/00*
U.S. Cl. 156—151 2 Claims



1. A method for manufacturing a brake shoe or disc brake pad having a friction material preform bonded to a back plate comprising steps the of:

electrolytically plating a coating of zinc onto the back plate;

inserting the back plate into a mold;

applying adhesive to one of the top surface of the back plate which engages the friction material preform or the bottom surface of the friction material preform which engages the back plate;

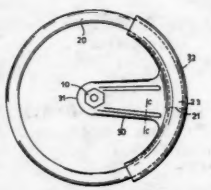
subjecting the friction material preform and back plate to a combination of heat and pressure such that the adhesive is properly cured to achieve a single bond between the friction material preform and the back plate.

4,976,801

PROCESS FOR MANUFACTURING A STEERING WHEEL FOR A MOTOR VEHICLE

Robert Martine, Audincourt, and Christian Hénigue, Delle, both of France, assignors to ECIA - Equipments et Composants pour l'Industrie Automobile, Audincourt, France

Continuation of Ser. No. 311,554, Feb. 16, 1989, abandoned.
This application Jan. 8, 1990, Ser. No. 463,799
Claims priority, application France, Feb. 19, 1988, 88 02040
Int. Cl.[5] B28B *1/30*
U.S. Cl. 156—245 9 Claims



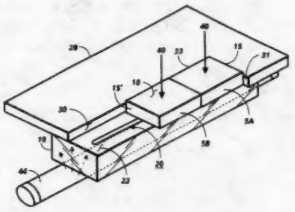
1. A process of manufacturing a steering wheel for a motor vehicle, said steering wheel comprising a central metallic hub, a peripheral metallic rim and at least one substantially radial branch interconnecting the hub and the rim, said branch comprising a sleeve, which surrounds the hub, and a sheath which at least locally covers the rim, said hub and said rim being the sole metallic parts of the steering wheel, said process comprising: providing a synthetic material in the state of a semi-manufactured product, said synthetic material being free of any metallic reinforcing elements; and, in a single step, compression-molding only said synthetic material onto the hub and rim to directly produce a branch with an integral sleeve and sheath which are firmly fixed directly to the hub and rim, respectively.

4,976,802

PROCESS FOR ASSEMBLING SMALLER SCANNING OR PRINTING ARRAYS TOGETHER TO FORM A LONGER ARRAY

Ewart O. LeBlanc, Fairport, N.Y., assignor to Xerox Corporation, Stamford, Conn.

Filed Oct. 16, 1989, Ser. No. 421,919
Int. Cl.[5] B32B *31/00*
U.S. Cl. 756—273.5 4 Claims



1. A method of fabricating a longer array from a plurality of discrete chips, each chip having one side with at least one row of scanning or printing elements thereon and an opposite side with at least one conductive strip, comprising the steps of:

(a) applying at least one bead-like stripe of a transparent photocurable adhesive to one side of a transparent substrate for attaching said chips thereto;

(b) placing said plurality of chips in aligned end-to-end abutting relation with one another on said substrate with said one side of said chips against said substrate surface and in contact with said adhesive;

(c) exposing said adhesive through said substrate to light to cure said adhesive and bond said chips to said substrate to provide a subassembly composed of said substrate with said plurality of chips attached thereto in end-to-end abutting relation;

(d) inverting said subassembly and placing the opposite side of said chips against a conductive substrate having at least one stripe of heat curable conductive adhesive thereon for establishing a bond between the conductive strip on said chips and said substrate; and

(e) curing said conductive adhesive to bond said subassembly to said substrate and establish a conductive path between the conductive strip on said chips and said substrate.

4,976,803

APPARATUS FOR PRESSING FOIL ON CONTAINERS, SUCH AS ON THE TOPS AND THE NECKS OF BOTTLES OR THE LIKE

Josef Tomashauer, Willich; Rudolf Zodrow, and Rainer Buchholz, both of Düsseldorf, all of Fed. Rep. of Germany, assignors to ETI-TEC Maschinenbau GmbH, Erkrath, Fed. Rep. of Germany

Filed Feb. 15, 1989, Ser. No. 311,609
Claims priority, application Fed. Rep. of Germany, Feb. 19, 1988, 3805188; Oct. 5, 1988, 3833850
Int. Cl.[5] B65C *3/00, 9/00*
U.S. Cl. 156—297 19 Claims

1. A method for pressing and attaching foil sheets around the top and neck of bottles comprising:

transporting said bottles and foil sheets along a predetermined path of travel to a transfer station;

transporting said bottles and foil sheets along a predetermined path of travel from said transfer station to a pressing station;

moving foil pressing means in a movement at least a portion of which is a combined simultaneous axial and radial movement with respect to said path of travel of said bot-

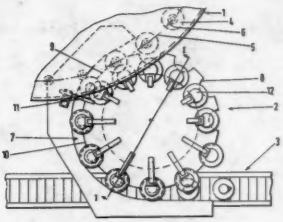
tles from said transfer station to said pressing station, from a retracted position out of said predetermined paths of travel to an extended position above said top of said bottles; and

moving said foil pressing means in a movement at least a portion of which is an axial movement only with respect to said path of travel of said bottles to said pressing station to press and attach said foil sheets around the top and neck of said bottles.

2. Apparatus for pressing and attaching foil sheets around the top and neck of bottles comprising:

means for transporting said bottles and foil sheets along a predetermined path of travel to a transfer station;

means for transporting said bottles and foil sheets along a predetermined path of travel from said transfer station to a pressing station;



means in said pressing station for pressing said foil sheets around the top and neck of said bottles;

said means for pressing said foil sheets including operative means for moving said foil pressing means in a movement at least a portion of which is an axial movement only with respect to said path of travel of said bottles from said transfer station to said pressing section;

said operative means for moving said foil pressing means being mounted on a rotatable support; and

said operative means for moving said foil pressing means also provides movement at least a portion of which is a combined simultaneous axial and radial movement which respect to said path of travel of said bottles from said transfer station to said pressing station, from a retracted position out of said predetermined paths of travel to an extended position above said top of said bottles.

4,976,804

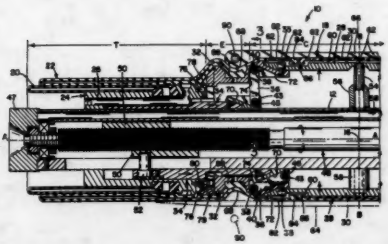
EXPANDABLE TIRE BUILDING DRUM

Fernand Kneip, Diekirch, Luxembourg, assignor to The Goodyear Tire & Rubber Company, Akron, Ohio

Filed May 5, 1989, Ser. No. 347,584

Int. Cl.[5] B29D *30/24, 30/32*

U.S. Cl. 156—401 **8 Claims**



1. A radially expanded tire building drum for building a small diameter tire with large bead portions comprising a rotatable hollow shaft mounted on a supporting structure, a pair of hub assemblies slidably mounted on said shaft for axial movement on opposite sides of a centerplane of said drum, a plurality of circumferentially spaced drum segments positioned radially outward of said shaft, each of said drum segments having a center portion and opposing end portions, a set of links pivotally connected to said hub assemblies and to said drum segments, bladder support members adjacent the end portions of said drum segments, a center sleeve of resilient material extending around the center portions of said drum segments, bottom turnup bladders mounted on said bladder support members, a right-hand/left-hand screw disposed coaxially in said shaft, nut members in threaded engagement with the left-hand portion and right-hand portion of said screw and being connected to said hub assemblies for moving said hub assemblies in opposite directions relative to said centerplane upon rotation of said screw, each of said links being movable between a generally axial position and a generally radial position to selectively expand and retract said drum segments between an expanded position and a retracted position, each of said end portions having a radially outer surface with a recess in said surface for a bead pocket so as to seat said large bead portions in said pocket at each end portion of said drum segments upon expansion of said center portion and said end portions of each of said drum segments by movement of said set of links.

4,976,805

PROCESS FOR MANUFACTURE OF DECORATIVE INTERMEDIATE FILMS FOR USE IN LAMINATED GLASS SHEETS

Sumio Ishii, Otsu; Tetsuya Fukuda, Kyoto, and Nobumoto Kani, Kawaguchi, all of Japan, assignors to Dai Nippon Insatsu Kabushiki Kaisha, Japan

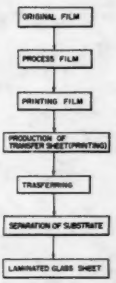
PCT No. PCT/JP88/00244, § 371 Date Nov. 7, 1988, § 102(e) Date Nov. 7, 1988, PCT Pub. No. WO88/07027, PCT Pub. Date Sep. 22, 1988

PCT Filed Mar. 9, 1988, Ser. No. 278,290

Claims priority, application Japan, Mar. 9, 1987, 62-53245

Int. Cl.[5] B32B *17/00*

U.S. Cl. 156—100 **12 Claims**



1. A method for producing a laminated glass sheet, sequentially comprising the following steps:

deposting a printing ink onto a transfer sheet substrate to form a printed pattern surface on said transfer sheet substrate;

applying a solvent to said pattern surface and an intermediate film for softening a vehicle of said printing ink and a vehicle of said intermediate film, said intermediate film being made of a thermoplastic resin and having fine projections and recesses on both surfaces thereof;

superposing said pattern surface having said solvent applied thereon onto said intermediate film;

pressing said superposed pattern surface into said intermedi-

ate film at a temperature below a glass transition point of said intermediate film;

separating said transfer sheet substrate from said intermediate film having said pattern surface pressed therein;

drying said intermediate film; and

interposing said intermediate film between two glass sheets and pressing said glass sheets together while heating, thereby forming said laminated glass sheet.

4,976,806

BONDING COMPOSITION FOR CERAMICS COMPRISING METAL OXIDE MELT AND METHOD FOR BONDING CERAMICS

Nobuya Iwamoto, Kobe; Norimasa Umesaki; Hiroaki Hidaka, both of Osaka, and Yukio Haibara, Funabashi, all of Japan, assignors to Sumitomo Cement Co., Ltd., Tokyo, Japan

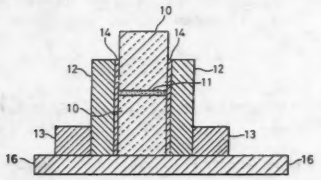
PCT No. PCT/JP86/00156, § 371 Date Jul. 29, 1987, § 102(e) Date Jul. 29, 1987, PCT Pub. No. WO87/02028, PCT Pub. Date Apr. 9, 1987

PCT Filed Mar. 31, 1986, Ser. No. 57,522

Claims priority, application Japan, Sep. 30, 1985, 60-214864

Int. Cl.[5] C09J *5/00*

U.S. Cl. 156—325 **8 Claims**



1. A method for bonding ceramics, which comprises melt-bonding a metal oxide melt bonding composition consisting of, based on the weight of the metal oxide melt, (a) 30 to 60% by weight of CaO, (b) 15 to 45% by weight of SiO_2 and (c) 10 to 40% by weight of TiO_2 on the surface of a ceramic material composed of Si_3N_4; and bonding the ceramic material to an adhered composed of Si_3N_4.

4,976,807

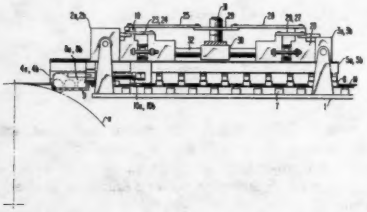
APPARATUS FOR STICKING A METAL CORD STRIP

Nobuhiko Irie, and Jiro Agawa, both of Nagasaki, Japan, assignors to Mitsubishi Jukogyo Kabushiki Kaisha, Tokyo, Japan

Filed Apr. 12, 1989, Ser. No. 336,908

Int. Cl.[5] B29C *31/08*

U.S. Cl. 156—405.1 **1 Claim**



1. An apparatus for sticking a metal cord strip comprising: left and right roller brackets disposed respectively on left and right sides of a conveying passageway of a metal cord strip; roller bracket moving means for moving said respective left and right roller brackets by a same amount in a direction towards or away from a center line in the conveying direction of the metal cord strip according to a width of the metal cord strip; left and right guide rollers mounted in multiple on opposed surfaces of said respective left and right roller brackets; left and right outlet guide plates and left and right magnets mounted to end portions on the downstream side in the conveying direction of said respective left and right roller brackets; left and right magnet moving means for moving said respective left and right magnets between attracting positions on a backside of said respective left and right outlet guide plates and retreating positions separated from said respective left and right outlet guide plates; left and right press rollers adapted to be lowered for pressing a leading and a trailing end portion of the metal cord strip against a tire forming drum; and, press roller raising and lowering means for raising and lowering said respective left and right press rollers.

4,976,808

PROCESS FOR REMOVING A POLYIMIDE RESIN BY DISSOLUTION

Shuichi Ogasawara, Ichikawa, Japan, assignor to Sumitomo Metal Mining Company Limited, Tokyo, Japan

Filed Apr. 11, 1990, Ser. No. 507,461

Claims priority, application Japan, Apr. 22, 1989, 1-102956

Int. Cl.[5] B44C *1/22*; C23F *1/02*; B29C *37/00*; C03C *15/00*

U.S. Cl. 156—638 **5 Claims**

1. In a process for manufacturing a tape for tape automated bonding from a substrate prepared by forming an electrolessly plated copper layer on a polyimide resin, and heat treated at a temperature of 120° C. to 420° C., said process including patterning said copper layer to form leads, etching any unwanted portion of said copper layer, and removing any unwanted portion of said resin by dissolution from said substrate, the improvement wherein said removing comprises:

dissolving said unwanted portion of said resin in a solution containing hydrazine hydrate, whereby said resin portion is substantially removed, while an organic substance is formed to remain as an undissolved film; and

removing said undissolved film by treating it with at least one, but at most two solutions selected from a solution containing ammonium ions, a solution containing halogen ions and a solution which can dissolve copper.

4,976,809

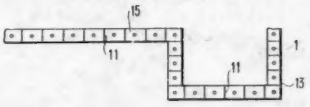
METHOD OF FORMING AN ALUMINUM CONDUCTOR WITH HIGHLY ORIENTED GRAIN STRUCTURE

Eliot K. Broadbent, San Jose, Calif., assignor to North American Philips Corp, Signetics Division, Sunnyvale, Calif.

Filed Dec. 18, 1989, Ser. No. 452,860

Int. Cl.[5] B44C *1/22*; C23F *1/02*; C03C *15/00, 25/06*

U.S. Cl. 156—643 **5 Claims**



1. A method for reducing electromigration of aluminum or aluminum alloy polycrystalline conductors on a dielectric layer of a semiconductor device comprising:

(a) etching an array of columns of holes at least three hole wide rows in said dielectric layer, said holes extending only partially through said layer in a line pattern corresponding to that of a desiring interconnection pattern, the pitch of said holes being about ½–5 μm and said holes having a depth of 1/10–½ μm,

(b) depositing a thin film of aluminum or aluminum alloy of a thickness at least sufficient to fill said holes on the surface of said dielectric layer provided with said holes,

(c) scanning said film of aluminum or aluminum alloy with a laser beam of an intensity sufficient to melt said film and

cause it to flow and be planarized and upon cooling forming an oriented crystal structure with grain boundaries aligned orthogonally to rows and columns of the hole pattern,

(d) aligning a photoresist mask with said crystal structure in a manner such that grain boundaries extend substantially only in a direction across the width of the desired conductor lines, and

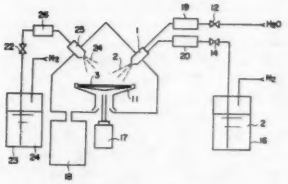
(e) then removing aluminum material from said crystal structure outside of said desired conductor lines by plasma etching said crystal structure thorough said aligned photoresist mask.

4,976,810

METHOD OF FORMING PATTERN AND APPARATUS FOR IMPLEMENTING THE SAME

Satoshi Masuda, Tokyo; Fumiaki Shigemitsu, and Kinya Usuda, both of Yokohama, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Mar. 6, 1990, Ser. No. 489,231
Int. Cl.[5] B44C *1/22*; C23F *1/02*; C03C *15/00, 25/06*
U.S. Cl. 156—659.1 **19 Claims**



1. A method of forming a pattern includes:

a step of forming a resist film on a metal thin film subject to etching formed on a substrate;

a step of patterning said resist film to provide a resist pattern;

step of allowing said resist pattern to have hydrophilic property by a surface property modifying agent including cerium ammonium nitrate $[(NH_4)_2Ce(NO_5)_6]$ as a major component; and

a step of etching said metal thin film by an etchant using said resist pattern caused to have hydrophilic property as a mask.

4,976,811

APPARATUS FOR SEALING FILM INCLUDING SEALING HEAD WITH WEDGE-SHAPED LOWER-PORTION

Lester D. Siebert, Carbondale, Ill., assignor to Com-Pac International, Inc., Centralia, Ill.

Filed Jul. 12, 1988, Ser. No. 217,854
Int. Cl.[5] B29C *65/10*; B29D *5/10*
U.S. Cl. 156—66 **24 Claims**

1. Apparatus for securing a first web of plastic material to a second web, comprising:

platen means having a curved upper surface with a selected radius of curvature;

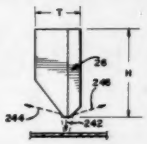
at least one elongated sealing head positionable above said platen means to define a welding station, said sealing head having opposed exterior side walls extending the length of said head, said side walls including lower wall portions having elongated bottom edges, the lower wall portions tapering downwardly and inwardly to define an elongated, curved lower edge and to form an elongated lower sealing head portion which is generally wedge-shaped in cross-section;

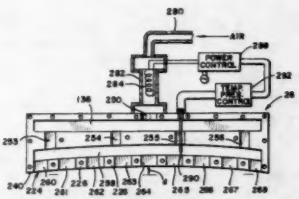
means for moving said sealing head into a position wherein said curved lower edge is closely spaced from said platen curved upper surface to provide an elongated welding gap therebetween;

means drawing first and second webs longitudinally along said platen curved upper surface through said elongated welding gap, said webs being aligned with and extending the length of said welding gap;

means supplying hot air under pressure and at a preselected, controllable temperature to said sealing head;

passage means within said sealing head for guiding said air in a tortuous path through said sealing head to maintain said sealing head at a preselected temperature and including narrow, elongated exit slot means formed in and extending





along substantially the entire length of said elongated lower edge of said sealing head, said exit slot being located to direct hot air under pressure from said sealing head toward the surface of said first and second webs along the entire longitudinal length of said sealing head to press said webs together, said hot air being reflected from the surface of said webs back toward and against the outer surface of said tapered lower portion of said head to deflect said air outwardly away from said webs and said head, whereby only narrow portions of said webs within said gap are heated to continuously weld said webs together along a narrow weld line as said webs pass through said welding gap.

4,976,812

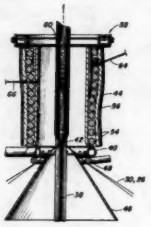
IN-LINE CONSOLIDATION OF BRAIDED STRUCTURES

Ronald F. McConnell, West Chester, Pa., and Peter Popper, Wilmington, Del., assignors to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Continuation of Ser. No. 151,582, Feb. 2, 1988, abandoned. This application Dec. 4, 1989, Ser. No. 449,100
Int. Cl.[5] B29C *65/02*; D04C *1/14, 3/00*
U.S. Cl. 156—148 **2 Claims**

1. A method of building and consolidating a composite structure from melt impregnated fiber reinforced thermoplastic resin strands comprising: advancing said strands toward a mandrel;; converging said strands under tension in a braiding pattern around a location on said mandrel to form a braided composite structure thereon; heating said strands to a temperature which will cause the thermoplastic resin to soften and flow prior to their contacting the mandrel for braiding around said location; advancing said braided structure while continu-

ing to heat said structure to cause continuing softening and flow as the structure advances, said temperature being below



the degradation temperature of the resin; and cooling said structure.

4,976,813

PROCESS FOR USING A COMPOSITION FOR A SOLDER MASK

George A. Salensky, Whitehouse Station, and Thomas S. Thoman, Cranford, both of N.J., assignors to Amoco Corporation, Chicago, Ill.

Continuation-in-part of Ser. No. 214,380, Jul. 1, 1988. This application Apr. 27, 1989, Ser. No. 343,744

Int. Cl.[5] B44C *1/17*

U.S. Cl. 156—230 **4 Claims**

1. A process for forming a directly solderable printed circuit article comprising:

(1) providing a release surface;

(2) applying a solder mask over the release surface and drying the solder mask wherein the solder mask comprises polyhydroxyether, melamine formaldehyde, solvent, filler and flow control agent;

(3) applying an ink comprising a thixotropic thermosetting resin composition containing a desired amount of an electrically conductive metal powder and high surface area metal flake to the release surface over the mask in the configuration of a solderable electric circuit element and drying the ink;

(4) printing in registration with the ink circuit element and mask a reactive thixotropic adhesive interface capable of interacting with the thermosetting resin composition of step (3) and with a thermosetting dielectric surface and drying the adhesive;

(5) bringing together the release surface and the thermoplastic dielectric surface so that the solderable electrical circuit element is facing the dielectric surface and is separated therefrom by the adhesive interface; and

(6) applying sufficient heat and pressure to form a composite structure whereby the thermosetting resin is cured and the adhesive is interacted whereby the electrical circuit element is transferred from the release surface and bonded to the thermoplastic dielectric surface.

4,976,814

METHOD OF MAKING A CERAMIC SEMICONDUCTOR PACKAGE HAVING CRACK ARRESTOR PATTERNS

Kent M. Blumenshine; Harris L. Marcus, and Kathleen A. Long-Daugherty, all of Austin, Tex., assignors to Motorola, Inc., Schuamburg, Ill.

Division of Ser. No. 220,292, Jul. 18, 1988, Pat. No. 4,922,326. This application Dec. 18, 1989, Ser. No. 452,473

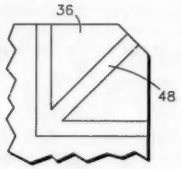
Int. Cl.[5] H01L *23/14*

U.S. Cl. 156—277 **12 Claims**

1. A method of fabricating a ceramic semiconductor package comprising the steps of:

providing a plurality of layers of ceramic material, each of said layers of ceramic material having a first surface and a second surface;

screen printing metal interconnect lines and metal crack arrestor patterns onto said first surface of at least one of said layers of ceramic material; and



bonding said plurality of layers of ceramic material including said metal interconnect and crack arrestor patterns together in a predetermined manner.

4,976,815

DRAFT CHAMBER

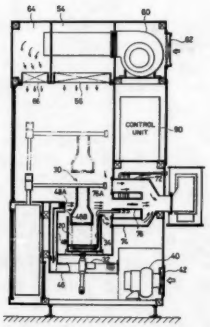
Yutaka Hiratsuka, Chiyoda; Tadahiro Ohmi, Sendai-shi, Miyagi; Junichi Murota, Sendai; Yoshio Fujisaki, Chiyoda; Masato Noda, Chiyoda; Yoshimitsu Kitada, Chiyoda, and Terutaka Sahara, Chiyoda, all of Japan, assignors to Ohmi Tadahiro and Hitachi Plant Engineering & Construction Co., Ltd., both of, Japan

Continuation of Ser. No. 172,783, Mar. 28, 1988, abandoned. This application Oct. 25, 1989, Ser. No. 426,208

Claims priority, application Japan, Apr. 3, 1987, 62-082378

Int. Cl.[5] H01L *21/306;* B01L *1/00*

U.S. Cl. 156—345 **7 Claims**



1. A draft chamber provided within a clean room, containing therein a plurality of chemical solution vessels generating toxic gasses and including a window having means for operating carriers in the front surface of the draft chamber to process said carriers by sequentially immersing said carriers in said solution vessels, said draft chamber comprising:

first air flow generating means including a seal air fan for inhaling clean air in the clean room, a blow-off port formed in front of an upper edge of said solution vessels generating toxic gasses, for blowing said clean air, an inhalant port, formed opposite to said blow-off port in the rear of said solution vessels, for inhaling air, and a duct having an exhaust fan for discharging the inhaled air externally of said clean room, for generating a first air flow moving in a substantially horizontal direction from said blow-off port toward said inhalant port above the

surfaces of solutions contained in said solution vessels to air seal the upper surfaces of said solution vessels; and

second air flow generating means for generating a second air flow moving downward from the ceiling of said draft chamber to be discharged out externally of said clean room, said second air flow being slower than said first air flow;

the first and second air flow generating means being provided and positioned so that said toxic gasses generated from said chemical solution vessels are prevented from leaking into said clean room and are discharged through said inhalant port.

4,976,816

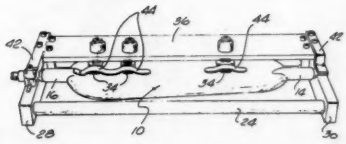
LATEX CONTAINER WITH INTEGRAL HOLDING STRAPS, AND METHOD AND APPARATUS FOR MAKING SAME

Peter Coye, 777 W. 7th St., Claremont, Calif. 91711

Filed Jul. 19, 1988, Ser. No. 221,112

Int. Cl.[5] B32B *35/00, 31/04*

U.S. Cl. 156—537 **5 Claims**



1. Apparatus for forming an integral latex loop on a latex rubber surface comprising in combination:

first and second portable molds configured to be dipped into a container of liquid latex and for respectively supporting first and second curing latex surfaces formed thereon after removal from the container;

a frame member for releasably securing said first portable mold so that said first curing latex surface thereon is oriented in a generally horizontal plane;

a cuttable substrate for supporting the second latex surface subsequent to removal of said second latex surface from said second mold;

cutting means for cutting the substrate and said second latex surface thereon into a plurality of generally strip-shaped lengths of latex and substrate, each length having a pair of end portions separated by a mid-portion; and

means for supporting the mid-portion of a said strip-shaped length of latex and substrate above said first latex surface sufficiently close to permit the latex at the end portions of said strip-shaped length to contact said first latex surface for integral bonding therewith as the latex surfaces continue to cure to form an integral loop on said first latex surface,

the substrate being removable from the strip-shaped length after the latex surfaces have bonded.

4,976,817

WET LAMINATION PROCESS AND APPARATUS

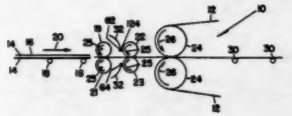
Jose L. Correa, Fullertown; Robert C. Stumpf, Orange; Charles L. Farnum, Riverside, and Leo Roos, Laguna Beach, all of Calif., assignors to Morton International, Inc., Chicago, Ill.

Filed Dec. 9, 1988, Ser. No. 282,174

Int. Cl.[5] B05C *1/08*

U.S. Cl. 156—555 **17 Claims**

1. Apparatus comprising means for laminating a photopolymerizable film onto at least one surface of a substrate and means for applying fluid to the at least one substrate surface before laminating a photopolymerizable film thereon, said fluid applying means comprising a pair of upper and lower parallel elongate roller means for engaging and passing the substrate horizontally therebetween, fluid absorbent means on said roller means for applying fluid to the at least one substrate surface as the substrate is passed horizontally between the roller means, means for applying fluid to said fluid absorbent means, a pair of end portions comprising first and second shaft portions on each of said roller means, a bearing means in which each said shaft portion is rotatably engaged, means for supportively housing each of said bearing means, means including a driven gear on one of said shaft portions on at least one of said roller means and a driving gear which meshes with said driven gear for rotating said at least one of said roller means whereby rotation



of both roller means may be effected to pass the substrate therebetween, said housing means comprising first and second support members each having an upper surface and means defining a vertically extending slot in said upper surface for receiving said bearing means for said first and second shaft portions, respectively, of said roller means, the axis of said driving gear being lower than the axis of said driven gear whereby the roller means may be removed by lifting the roller means with the bearing means and driven gear attached thereto vertically out of the slot means.

4,976,818

FINE PATTERN FORMING METHOD

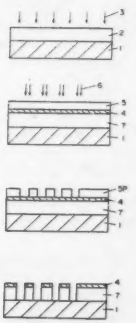
Kazuhiko Hashimoto, Moriguchi; Taichi Koizumi, Osaka; Kenji Kawakita, Neyagawa, and Noboru Nomura, Kyoto, all of Japan, assignors to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

Division of Ser. No. 266,871, Oct. 26, 1988, Pat. No. 4,936,951. This application Apr. 24, 1990, Ser. No. 520,654

Claims priority, application Japan, Oct. 26, 1987, 62-269678; Feb. 26, 1988, 63-45202

Int. Cl.[5] B44C *1/22;* **B29C** *37/00;* **C03C** *15/00;* **C23F** *1/02*

U.S. Cl. 156—643 **2 Claims**



1. A fine pattern forming method comprising the steps of:

(a) applying an organic polymer film on a semiconductor substrate;

(b) reducing the surface of said organic polymer film by irradiating said surface with hydrogen ions;

(c) forming an insulation film on the resultant organic polymer film;

(d) forming a radiation-sensitive resist film on said insulation film;

(e) forming a predetermined pattern in said radiation-sensi-

tive resist film by exposing said resist film to a radiation beam and thereafter developing said radiation-sensitive resist film;

(f) etching said insulation film using said predetermined pattern of said radiation-sensitive resist film as a mask; and

(g) etching said organic polymer film using the etched insulation film as a mask.

4,976,819

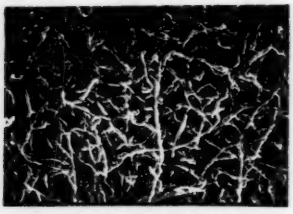
PULP TREATMENT METHODS

Mary L. Minton, Cloquet, Minn., assignor to Potlatch Corporation, Cloquet, Minn.

Filed Apr. 28, 1988, Ser. No. 187,660

Int. Cl.[5] D21C *9/00*

U.S. Cl. 162—9 **25 Claims**



TREATED

1. A method for producing improved soft paper products by mechanically treating pulp of up to 50% O.D. consistency, comprising the steps of:

wringing, dewatering and compacting the pulp of up to 50% O.D. consistency to permanently twist and kink individual fibers to a degree that is substantially irreversible when they are subsequently subjected to papermaking process steps, the treated pulp having,

(a) increased freeness;

(b) reduced tensile strength;

(c) increased bulk;

(d) reduced tearing resistance; and

(e) greater softness, over the same pulp that has not been so mechanically treated; and

feeding the treated pulp into a headbox of a papermaking machine to produce a paper product having greater softness than a paper product made from the same pulp that has not been so mechanically treated.

4,976,820

METHOD FOR HOT-PRESSING OF A WEB

Jorma Laapotti, Palokka, Finland, assignor to Valmet Paper Machinery Inc., Finland

Filed Apr. 28, 1988, Ser. No. 187,259

Claims priority, application Finland, Apr. 28, 1987, 871870; Feb. 15, 1988, 880700

Int. Cl.[5] D21F *3/00*

U.S. Cl. 162—206 **17 Claims**

1. Method for pressing and dewatering a web, comprising the steps of

providing a combination of:

a cylinder having a smooth mantle face which is heatable to a temperature higher than about 100° C. before reaching direct contact with the web,

means for heating said cylinder face;

a press roll about which a glide belt is guided and tensioned around the surface of said press roll facing said web, said press roll being arranged to form a roll press nip with said face of said cylinder;

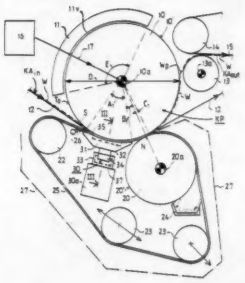
a press shoe arranged before said roll nip in a direction of travel of the web, said press shoe being in close proximity to but not abutting said press roll and said press shoe being the sole element forming an extended press nip with said face of said cylinder substantially immediately before said roll press nip, and

a water receiving press fabric arranged to pass through said extended nip and roll nip between the web and said press glide belt,

heating said cylinder face to a temperature higher than about 100° C.,

pressing the web against the cylinder face in said extended nip for a relatively long pressing time and at a relatively low compression pressure, of no more than 5 MPa,

lowering the compression pressure after said extended nip so that vaporization of moisture present in the web is intensified as the web laps the cylinder, and



in said roll nip against the same cylinder, substantially immediately intensifying the pressure to a peak value that is substantially higher than the pressure applied in the extended nip pressing step, so that vapor is blown through the web and thereby causes some of the moisture present in intermediate spaces between fibers in the web to be blown out, thus intensifying the dewatering, wherein said wet web is heated as it is being brought into contact with said cylinder face during its passage through said extended nip pressing, pressure lowering and pressure intensifying steps.

4,976,821

PRESS SECTION WITH SEPARATE PRESS ZONES IN A PAPER MACHINE

Jorma Laapotti, Palokka, Finland, assignor to Valmet Oy, Finland

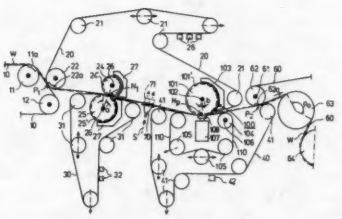
Continuation of Ser. No. 190,470, May 5, 1988, abandoned, Continuation-in-part of Ser. No. 735,782, May 20, 1985, abandoned. This application Oct. 26, 1989, Ser. No. 427,740

Claims priority, application Finland, May 25, 1984, 842114

The portion of the term of this patent subsequent to Jun. 5, 2007, has been disclaimed.

Int. Cl.[5] D21F *3/04*

U.S. Cl. 162—360.1 **19 Claims**



1. A press section of a paper machine, comprising

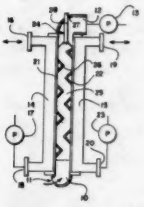
one pick-up roll,
three press rolls,
a plurality of fabric guiding rolls,
one press shoe,
three pressing fabrics forming fabric loops,
a dense compression belt loop, and
two and only two press nips having respective nip zones for removing water from a web running through said nips in said press section,
a first one of said nips in a direction of run of the web through said press section being formed between two of said three press rolls and a second one of said nips being formed between said shoe and a third one of said press rolls and constituting an extended nip with a nip zone thereof being substantially longer than length of the nip zone of said first press nip, said press shoe being situated within the loop of the dense compression belt,
a first one of said three pressing fabrics passing through said first nip,
a second one of said three fabrics passing through said first and second nips,
a third one of said three fabrics passing through said second nip,
said dense compression belt passing within a loop formed by one of said three fabrics,
wherein said rolls, nips, fabrics and belt are arranged to transport the web in a closed draw on said second fabric from said first nip to said second nip, and to detach the web substantially immediately after said second nip from said second or third fabric which is water-receiving, to prevent re-wetting of the web after the second nip,
wherein two of said three fabrics are water-receiving press fabrics and one fabric thereof is a substantially non-water receiving fabric,
wherein both said substantially non-water receiving fabric and said dense compression belt pass through said second extended nip,
wherein said rolls, nips, fabrics and belt are arranged to transport the web in a closed draw on said substantially non-watering receiving fabric from said second nip to a drying section of the paper machine.

4,976,822

APPARATUS FOR CLEANING FIBERS

Martti Y. O. Kangas, P.O. Box 2470, Decatur, Ga. 30031

Filed May 15, 1989, Ser. No. 351,384
Int. Cl.[5] D21D *9/02, 9/06*
U.S. Cl. 162—380 **6 Claims**



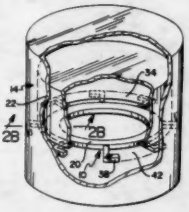
1. Apparatus for cleaning fibers, said fibers having been processed to be separated and suspended in a liquid to form a slurry, said apparatus including a passageway for receiving said slurry, means for moving said slurry through said passageway, at least one screen having an inner side and an outer side forming one wall of said passageway, said screen defining openings therethrough of sufficient size for contaminants on said fiber to pass through said openings, fluidizing means in said passageway having agitating means adjacent to the inner side of the screen for preventing agglomeration of said fibers and for maintaining the individual fibers in suspension in said slurry, and channel means adjacent to the outer side of said at least one screen and means for moving wash water through said channel means, and means for creating a pressure differential across said at least one screen for causing said wash water to move through said at least one screen for cleaning fibers in said slurry in said passageway.

4,976,823

SUPPORT RING WITH ADDITIONAL VOID SPACE

John S. Davis, Lake Jackson, Tex., assignor to BASF Corporation, Wyandotte, Mich.

Filed Jun. 27, 1988, Ser. No. 211,997
Int. Cl.[5] B01D *3/14*
U.S. Cl. 202—158 **2 Claims**



1. A support ring apparatus for supporting a load internal to a distillation tower, the distillation tower having an internal surface, the apparatus comprising:
(a) a support structure being disposed inside the internal surface of the distillation tower along a substantially horizontal plane, a vertical load being supportable and retainable upon the support structure, said support structure being a seat rim having a hollow central portion;
(b) a series of mechanical elements separating the seat rim from the internal surface of the distillation tower the series of mechanical elements being securely attachable to the seat rim and to the internal surface of the distillation tower, the mechanical elements being spaced apart from each other; and
(c) a multiplicity of vent openings being disposed between the series of mechanical elements, the vent openings enabling vapor disposed below the seat rim to be in fluid communication with vapor disposed above the seat rim, wherein the mechanical strength of the support ring apparatus is adjustable by varying the shape of the mechanical elements, by varying the number of mechanical elements, and by varying the spacing between the mechanical elements such that a support ring with improved void space is provided and localized flooding of said support ring is substantially avoided.

4,976,824

WATER DISTILLATION AND AERATION APPARATUS

Naisin Lee, 862 Garland Dr., Palo Alto, Calif. 94303

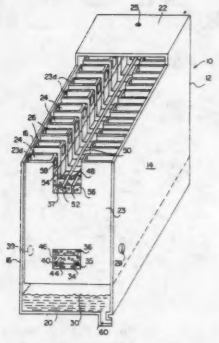
Continuation of Ser. No. 207,572, Jun. 16, 1988, abandoned. This application Dec. 22, 1989, Ser. No. 456,080
Int. Cl.[5] B01D *3/02; C03F 1/04*
U.S. Cl. 202—172 **10 Claims**

1. Water distillation apparatus comprising:
a housing having wall means forming a compartment for containing water in a quiescent condition with the water having an upper surface at a predetermined level, the compartment having a lower end and an upper end, said compartment having an upper space near the upper end of the compartment and above the water level, the upper surface of the water being the interface between the water and said upper space when the water is contained in the compartment;

means near the lower end of the compartment for presenting a lower fluid receiving chamber;

means defining a fluid passage extending between and in fluid communication with said upper space and the lower chamber;

means in the compartment adjacent to and below the upper level of the water and in a position to directly contact the water in the compartment near said interface for substantially boiling the water to form water vapor at a vapor pressure sufficient to cause the water vapor to pass through said interface and into said upper space; and



means in the compartment adjacent to the lower end thereof for aerating the water to cause air bubbles to form and to rise in the water as the water is boiled, said wall means having surface structure positional and configured to channel the air bubbles substantially directly to the boiling means and to substantially maintain the water in the compartment in a substantially quiescent condition as the air bubbles rise in the water and the boiling means boils the water.

4,976,825

PROCESS FOR RECOVERING N-METHYLPYRROLIDONE BY PLURAL DISTILLATIONS

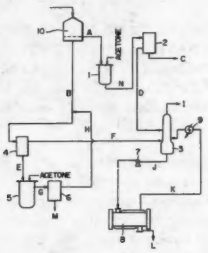
Takao Iwasaki; Katsumi Horikoshi, and Yuzo Yoshiji, all of Iwaki, Japan, assignors to Kureha Kagaku Kogyo Kabushiki Kaisha, Nihonbashi Horidome, Japan

Continuation of Ser. No. 42,459, Apr. 24, 1987, abandoned. This application Jun. 23, 1989, Ser. No. 372,221

Claims priority, application Japan, Apr. 28, 1986, 61-98698

Int. Cl.[5] B01D *3/00;* **C07D** *207/267;* **C08G** *75/14*

U.S. Cl. 203—71 **2 Claims**



1. A process for recovering N-methylpyrrolidone-containing liquid formed in the process for preparing a polyarylene thioether by the dehalogenosulfidation of a dihalogenoaromatic compound and an alkali metal sulfide in the presence of N-methylpyrrolidone as a polymerization solvent, to form a reaction mixture which comprises (a) separating the reaction mixture after polymerization into polyarylene thioether and the N-methylpyrrolidone-containing liquid, (b) subjecting the N-methylpyrrolidone-containing liquid to distillation to distill and recover the majority of N-methylpyrrolidone contained in the liquid while recovering a distillation residue having such a flowability that flow transferring of the distillation residue is possible, and (c) supplying the distillation residue to a mixing apparatus wherein mixing of the residue is effected at a temperature of 190° to 310° C. and a pressure of 50 to 760 Torr with a residence time in the apparatus of 5 minutes to 10 hours in such a manner that the residue is ensured to maintain a uniform temperature without local excessive heating thereby to distill and recover N-methylpyrrolidone contained in the residue.

4,976,826

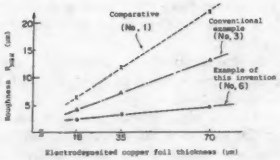
METHOD OF MAKING ELECTRODEPOSITED COPPER FOIL

Toshio Tani; Osamu Kamiyama; Noboru Matsuki; Ryosaku Fukuda; Tsukasa Akutsu, and Hiroshi Nakatsugawa, all of Imaichi, Japan, assignors to Furukawa Circuit Foil Co., Ltd., Tokyo, Japan

Filed Feb. 16, 1990, Ser. No. 481,434

Int. Cl.[5] C25D *1/04, 7/06*

U.S. Cl. 204—12 **11 Claims**


Comparative (No. 1)
Conventional example (No. 3)
Example of this invention (No. 6)
Roughness Rmax (μm)
Electrodeposited copper foil thickness (μm)

1. A method of making electrodeposited copper foil which comprises electrodepositing copper from an electrolytic solution which contains a water-soluble cellulose ether.

4,976,827

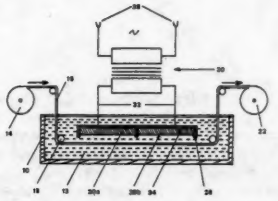
PROCESS FOR PRETREATING STRIPS AND FOILS OF ALUMINUM OR ALUMINUM ALLOYS

Zdenek Maly, Kreuzlingen, Switzerland, assignor to Swiss Aluminium Ltd., Chippis, Switzerland

Continuation-in-part of Ser. No. 792,275, Oct. 28, 1985, abandoned, which is a continuation of Ser. No. 711,598, Mar. 13, 1985, abandoned. This application Mar. 10, 1986, Ser. No. 837,807

Int. Cl.[5] C25D *9/06*

U.S. Cl. 204—15 **15 Claims**



1. Process for pretreating strips and foils of aluminum or aluminum alloys prior to lacquering, coating with adhesive or laminating with plastic, which comprises: providing an alumi-

num or aluminum alloy material in the form of strip or foil having a workface; providing a silicate-free non-toxic, non-hazardous aqueous electrolyte having a pH of 4.2 to 12.5 and consisting essentially of 0.01–10 weight percent of an organic compound that forms a complex with aluminum and contains at least one amino group with at least one carboxyl group attached to its nitrogen atom; heating said electrolyte to a temperature of from 25° to 95° C.; passing said material through said electrolyte; and supplying an alternating current of 10 to 500 coulomb/dm^2 to the workface while said material is passing through said electrolyte, and coating said material to provide improved adhesive qualities.

4,976,828

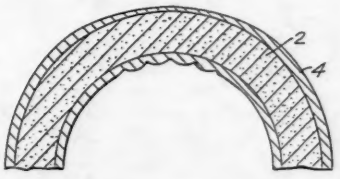
CHAFF COMPRISING METAL COATED FIBERS

Louis G. Morin, Tarrytown, N.Y., assignor to American Cyanamid Company, Stamford, Conn.

Continuation of Ser. No. 14,356, Feb. 13, 1987, abandoned, which is a division of Ser. No. 630,709, Jul. 13, 1984, Pat. No. 4,852,453, which is a continuation-in-part of Ser. No. 584,483, Feb. 28, 1984, Pat. No. 4,609,449, which is a continuation of Ser. No. 541,611, Oct. 13, 1983, abandoned, which is a division of Ser. No. 358,637, Mar. 16, 1982, abandoned. This application Feb. 6, 1989, Ser. No. 307,371

Int. Cl.^{5} C25D *5/54, 7/06*

U.S. Cl. 204—28 **6 Claims**



1. A process for the production of chaff comprising:
(a) providing a continuous length of a plurality of electrically conductive graphite core fibers,
(b) continuously immersing at least a portion of the length of said fibers in a bath capable of electrolytically depositing at least one metal,
(c) applying an external voltage of at least 10 volts to the fiber immediately prior to immersion in the bath,
(d) maintaining said voltage and resulting current for a time sufficient to produce a thin and uniform, firmly adherent, electrically conductive layer of electrolytically deposited metal on said core,
(e) maintaining said fibers cool enough outside the bath to prevent degradation of said fibers by recycling the bath to bathe the yarns or tows from the point of application of the external voltage to the point of immersion in the bath, and
(f) chopping the resultant metal coated fibers into shortened lengths relative to the wavelength of one or more radar frequencies.

4,976,829

COATING SUBSTRATES

John Ellis, 308 Walton Road, East Molesey, Surrey, England KT8 0HY; John W. Nicholson, 63 Morland Close, Hampton, Middlesex, England TW12 3YY, and Alan D. Wilson, 49 Shepherds Way, Liphook, Hampshire, England GU30 7HH

Division of Ser. No. 257,096, Oct. 13, 1988. This application Oct. 17, 1989, Ser. No. 422,522

Claims priority, application United Kingdom, Nov. 3, 1987, 8725714

Int. Cl.^{5} C25D *11/34*

U.S. Cl. 204—38.7 **8 Claims**

1. A process for producing a coherent protective layer on a metallic surface, said process comprising the steps of:
forming a layer of tin oxide on the metallic surface; and
reacting the tin oxide layer with an aqueous solution of a homo- or copolymer of polyacrylic acid) or even more highly carboxylated unsaturated-carbon-backbone acid or a hydrolyzable precursor thereof.

4,976,830

METHOD OF PREPARING THE SURFACES OF MAGNESIUM AND MAGNESIUM ALLOYS

Edith L. Schmeling, Brühl-Badorf; Beano Röschenbleck, Osnabrück, and Michael H. Weidemann, Kerpen-Horrem, all of Fed. Rep. of Germany, assignors to Electro Chemical Engineering GmbH, Zug, Switzerland

Filed Mar. 9, 1989, Ser. No. 321,253

Claims priority, application Fed. Rep. of Germany, Mar. 15, 1988, 3808610

Int. Cl.^{5} C25D *11/30*

U.S. Cl. 204—58.4 **16 Claims**

1. A method of preparing the surface of magnesium or a magnesium alloy by anodic oxidation, comprising immersing the magnesium or magnesium alloy in an alkali-rich aqueous electrolyte bath containing
(a) sulfate anions and
(b) phosphate and chloride ions
at a pH of about 8 to 12, applying a pulsed direct current to the bath, whereby on the surface of the magnesium or its alloy there is formed magnesium phosphate and magnesium fluoride or magnesium chloride.

4,976,831

PROCESS FOR MAKING A POLYMER-MODIFIED ELECTRODE AND PROCESS USING SAME FOR CHLORALKALI ELECTROLYSIS

Barry A. Murrer, 17 Carnarvon Road, Reading, Berks RG1 5SB; John Overstall, 28 Pine Road, Romsey, Hants S051 8SG, and Peter M. Willis, 21, Wantage Road, Wallingford, Oxfordshire OXIO OLR, all of Great Britain

PCT No. PCT/GB86/00039, § 371 Date Sep. 22, 1986, § 102(e) Date Sep. 22, 1986, PCT Pub. No. WO86/04364, PCT Pub. Date Jul. 31, 1986

Continuation of Ser. No. 201,266, Jun. 2, 1988, abandoned, which is a continuation of Ser. No. 915/254, Sep. 22, 1986, abandoned. This PCT application Jan. 21, 1986, Ser. No. 480,376

Claims priority, application United Kingdom, Jan. 21, 1985, 85/01479

Int. Cl.^{5} C25B *1/02, 11/06*

U.S. Cl. 204—98 **18 Claims**

18. A polymer modified electrode for use as a cathode in a chloralkali process, comprising:
(a) a nickel substrate;
(b) an electrocatalytic metal deposited on the substrate that is more electronegative than nickel and that is the result of an exchange deposition with a compound of the electrocatalytic metal; and
(c) a single layer of spherical or spheroidal solid particles of an alkali-resistant organafluorine polymer adhered to the substrate simultaneously with deposition of the electrocat-

alytic metal, the particles having an average size of from 0.05 to 20 μm and being present on the substrate in an amount of 0.0005 to 0.2 cm^3 of polymer per m^2 of nominal surface area of the substrate wherein at least 70% by

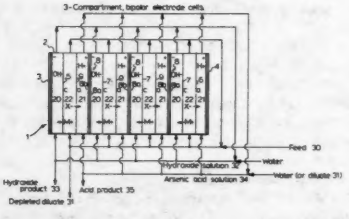
number of the particles are fully spaced apart from neighboring particles, whereby in use in the chloralkali process, the electrode exhibits a low hydrogen overvoltage and a resistance to poisoning by ferrous ions.

4,976,832

METHOD FOR MAKING ARSENIC ACID

Daniel A. D. Boateng, Montrose, Canada, assignor to Cominco Ltd., Vancouver, Canada

Filed Nov. 9, 1989, Ser. No. 433,867
Int. Cl.[5] C25B *1/22*
U.S. Cl. 204—98 **13 Claims**



1. A method for the production of arsenic acid which comprises the steps of passing an aqueous solution of an arsenate salt to cells of an electrolysis unit containing electrodes and membranes, said unit comprising terminal electrodes and at least one electrode/membrane group arranged between said terminal electrodes, each said group consisting of at least one membrane adjacent an intermediate electrode; at least defining a hydroxide compartment and an acid compartment between membranes and said electrodes; applying an electrical current between said electrodes at a value such that the value of the corresponding current density is in the range of about 10 to 4,500 A/m^2; passing flows of solutions through said cells; forming hydroxide-containing solution in said hydroxide compartment; forming arsenic acid-containing solution in said acid compartment; withdrawing hydroxide-containing solution from said hydroxide compartment; withdrawing arsenic acid-containing solution from said acid compartment; and recovering hydroxide solution and arsenic acid-containing solution.

4,976,833

ELECTRODEPOSITION COATINGS CONTAINING BLOCKED TETRAMETHYLXYLENE DIISOCYANATE CROSSLINKER

Tapan K. Debroy, Utica, and Ding Y. Chung, Rochester Hills, both of Mich., assignors to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Filed Oct. 4, 1989, Ser. No. 417,649
Int. Cl.[5] C08L *63/00*; C09D *5/44*; C25D *13/00*
U.S. Cl. 204—181.7 **6 Claims**

1. In a resin composition for use as the film forming component in a cathodic electrodeposition process, comprising the reaction product of (A) a polyepoxide amine adduct and (B) a blocked polyisocyanate cross-linking agent wherein the improvement comprises the blocked polyisocyanate crosslinking agent is prepared by reacting tetramethyl xylylene diisocyanate with a polyol having two or more hydroxyl groups to form a tetramethylxylylene diisocyanate/polyol adduct and totally blocking the isocyanate functionality of the tetramethylxylylene diisocyanate/polyol adduct with either an alcohol or mixture of alcohols or caprolactam.

4,976,834

ASYMMETRIC PHOTOCHEMICAL REACTION PROCESS

Fumio Toda, Ehime, Japan, assignor to Dalcel Chemical Industries, Ltd., Sakai, Japan

Filed Mar. 28, 1988, Ser. No. 173,994
Claims priority, application Japan, Apr. 3, 1987, 62-82256
Int. Cl.[5] B01J *19/08*
U.S. Cl. 204—157.69 **11 Claims**

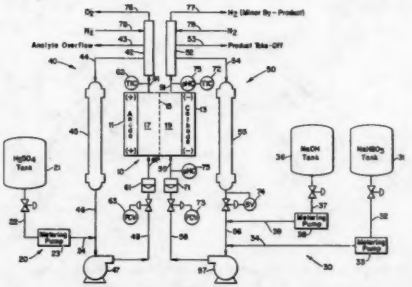
1. A process for obtaining an optically active substance having an optical purity of at least 50% e.e. by an asymmetric photochemical reaction, comprising the steps of: (1) mixing an achiral first compound with a second compound in a solvent to form chiral clathrate crystals of said first and second compounds; (2) irradiating the crystals to effect the photocyclization of said first compound; and (3) isolating the optically active substance.

4,976,835

ELECTROSYNTHESIS OF SODIUM DITHIONITE

Leonard L. Diaddario, Jr., Portsmouth, and Mark A. Schroeder, Norfolk, both of Va., assignors to Hoechst Celanese Corporation, Somerville, N.J.

Continuation of Ser. No. 164,874, Mar. 8, 1988. This application Sep. 12, 1989, Ser. No. 406,178
Int. Cl.[5] C25B *1/02, 1/14*
U.S. Cl. 204—92 **8 Claims**



1. In the electrolytic production of an aqueous dithionite salt solution, the improvement that comprises:

A. conducting the electrolysis in a two-compartment cell comprising: (1) an anode compartment containing an anode through which a sulfuric acid anolyte solution is circulated and (2) a cathode compartment containing a cathode and through which an aqueous sodium bisulfite salt solution is circulated as a catholyte therein and a cation permaselective membrane which is sealably disposed between said anode and cathode compartments; and

B. maintaining the following circulating conditions:

(1) an anolyte and catholyte temperature range of 20°–25° C.,

(2) a catholyte pH range of 4.8–5.2,

(3) a reduction potential of −1.25 to −1.50 V versus $Ag^+/AgCl$, and

(4) reducing said bisulfite solution to sodium dithionite at the cathode according to the reaction:

$2NaHSO_3+2e \rightarrow NaS_2O_4+2OH-$

while oxidizing water under acidic conditions at the anode according to the reaction:

$2H_2O \rightarrow O_2+4H^+ +4e^-$,

and thereby providing substantially no net consumption of protons or hydroxide ions in the overall reactions:

$4NaHSO_3+2H_2O \rightarrow 2Na_2S_2O_4+O_2+4H_2O$ or
$4NaHSO_3 \rightarrow 2Na_2S_2O_4+O_2+2H_2O$;

whereby the catholyte pH remains substantially constant over a pH range of 4.8 to 5.2.

4,976,836

OXIDIZERS FOR CATHODIC ELECTROCOATING PROCESS

Eulogio D. Lazaro, Brecksville, Ohio, assignor to The Glidden Company, Cleveland, Ohio

Filed Apr. 24, 1987, Ser. No. 41,931
Int. Cl.[5] C25D *13/06*
U.S. Cl. 204—181.7 **4 Claims**

1. In a cathodic electrocoating process for electrodeposition of a heat curable electrocoating composition containing a coreactive crosslinker onto a cathode substrate, the electrocoating composition containing a polymeric binder dispersed into an aqueous electrocoating bath solution, the polymeric binder containing carboxyl or hydroxyl groups for crosslinking with the crosslinker upon deposition onto a cathode substrate and heat curing the electrocoating composition, the improvement comprising:

adding to the electrocoating composition before electrocoating onto a cathode substrate, at least about 0.1% hydrogen peroxide based on the weight of polymeric binder and the crosslinker in the aqueous electrocoating composition where the addition of said hydrogen peroxide avoids evolution of hydrogen gas at the cathode during the electrocoating process.

4,976,837

BLOCKED ISOCYANATES

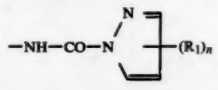
Anthony H. Hughes, Rossendale, and Arthur Topham, Middleton, both of United Kingdom, assignors to The Baxenden Chemical Co., Lancashire, England

Division of Ser. No. 706,391, Feb. 27, 1985, abandoned. This application Aug. 1, 1986, Ser. No. 892,898
Claims priority, application United Kingdom, Feb. 29, 1984, 8405320
Int. Cl.[5] C25D *13/06*
U.S. Cl. 204—181.7 **16 Claims**

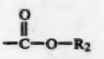
1. In a storage-stable coating composition comprising an active hydrogen-containing compound and a blocked polyisocyanate of the formula:

$R\text{-}Y_m$

wherein R is an m valent aliphatic, cycloaliphatic, heterocyclic or aromatic residue, m is an integer greater than 1 and Y is a blocking group, the improvement whereby said composition is curable by heat unblocking at 100° C. to 120° C., and each Y, which may be the same or different, is



wherein R_1 is, or, where n is more than 1, each R_1, which may be the same or different, is a C_1–C_4 alkyl, C_1–C_4 alkenyl, phenyl C_1–C_4 alkyl, phenyl, NO_2, <halogen or



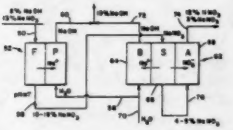
group where R_2 is a C_1–C_4 alkyl group; and n is 0, 1, 2 or 3, provided that, when R is an aromatic residue the groups Y are not directly attached to an aromatic nucleus.

4,976,838

METHOD FOR PURIFICATION OF BASES FROM MATERIALS COMPRISING BASE AND SALT

Krishnamurthy N. Mani, Basking Ridge; Frederick P. Chlanda, Rockaway, and Yu-Chih Chiao, Bridgewater, all of N.J., assignors to Allied-Signal Inc., Morristown, N.J.

Filed Dec. 1, 1988, Ser. No. 278,626
Int. Cl.[5] C01B *33/32*; B01D *13/02*
U.S. Cl. 204—182.3 **23 Claims**



1. A method of separating base from an aqueous feed stream comprising at least one base selected from the group consisting of NaOH, KOH and NH_4OH and at least one salt selected from the group consisting of NaCl, $NaNO_3$, NH_4Cl, Na_2SO_4, $FeSO_4$, $Fe_2(SO_4)_3$, $Ni(NO_3)_2$, $Cr(BF_4)_3$, NH_4NO_3, Na_3PO_4, $CuSO_4$, KF, said salts comprising cations and anions, in an apparatus comprising at least one bipolar membrane comprising a cation layer and an anion layer, wherein each cation membrane is between at least one first bipolar membrane and at least one second bipolar membrane, there being a feed compartment between the cation membrane and the cation layer of the at least one first bipolar membrane, and a product compartment between the cation membrane and the anion layer of the at least one second bipolar membrane, comprising the steps of:

feeding an aqueous feed stream comprising base and salt to the at least one feed compartment;

feeding an aqueous product stream to the at least one product compartment;

applying a sufficient electrical potential across the apparatus to cause a direct current resulting in the introduction of OH^- from the bipolar membrane into the product compartments and transport of cations from the feed across the anion membrane into the product compartment; and

removing the resulting product stream from the product compartment; and

removing the resulting feed stream from the feed compartment.

4,976,839

METHOD OF FORMING A BARRIER LAYER BETWEEN A SILICON SUBSTRATE AND AN ALUMINUM ELECTRODE OF A SEMICONDUCTOR DEVICE

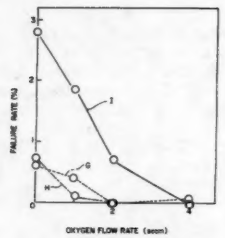
Minoru Inoue, Kawasaki, Japan, assignor to Fujitsu Limited, Kawasaki, Japan

Filed Jul. 24, 1989, Ser. No. 383,511
Claims priority, application Japan, Jul. 25, 1988, 63-185005
Int. Cl.[5] C23C *14/04, 14/06, 14/08*
U.S. Cl. 204—192.17 **11 Claims**

1. A method of forming an electrode layer, comprising aluminum, on a substrate, comprising silicon, comprising:

forming an insulating layer on said substrate, which insulating layer has at least one contact hole therein exposing said silicon and adapted to receive said electrode on said silicon therethrough thereby producing a first substrate;

exposing said first substrate to reactive sputtering with a refractory metal target in an environment comprising, a mixed gas comprising an inert gas, a reactive gas comprising a gas selected from nitrogen, a nitrogen compound, a carbon compound and a boron compound, and oxygen at a temperature of about 350° to 600° C., thereby producing



a second substrate containing a high density barrier layer refractory metal compound thereon comprising a reaction product of said reactive gas and said refractory metal, wherein the quantity of oxygen in said mixed gas is sufficient to create refractory metal oxide at the grain boundaries in said barrier layer in an amount sufficient to decrease the failure rate thereof but insufficient to significantly increase the resistivity thereof; and

forming a layer, comprising aluminum, on said barrier layer at least in said hole.

4,976,840

ELECTROPLATING APPARATUS FOR PLATE-SHAPED WORKPIECES

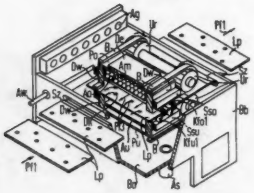
Daniel Hosten, Handzame, Belgium, assignor to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Aug. 16, 1989, Ser. No. 394,472

Claims priority, application Fed. Rep. of Germany, Sep. 1, 1988, 3829762

Int. Cl.[5] C25D *17/16*

U.S. Cl. 204—202 **15 Claims**



1. An electroplating apparatus for plate-shaped workpieces moving in a horizontal path, said apparatus comprising a container for an electrolytic solution having at least an anode extending in a horizontal direction, at least one conveyor means arranged laterally relative to the path, said at least one conveyor means being composed of an upper band drive and a lower band drive for the friction actuated entrainment of the workpiece between a lower run of the upper band drive and an upper run of the lower band drive, at least one contacting means being arranged laterally relative to the path and said band drives for the cathodic contacting of a lateral edge of the workpiece which projects beyond the band drives, and a sealing wall being arranged between the upper and lower runs of each of the band drives to form means for sealing the contacting means from the solution in the container.

4,976,841

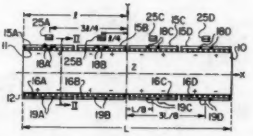
BUSBAR ARRANGEMENT FOR ALUMINUM ELECTROLYTIC CELLS

Richard F. Boivin; Jean-Paul R. Huni, and Robert LeBlanc, all of Quebec, Canada, assignors to Alcan International Limited, Montreal, Canada

Filed Oct. 19, 1989, Ser. No. 423,944

Int. Cl.[5] C25C *3/08, 3/16*

U.S. Cl. 204—243 M **27 Claims**



1. In an aluminum electrolysis cell having opposed longitudinal side walls and opposed end walls, a lining for containing cell contents including a molten metal pad, cathode collector bars extending through the lining, and cathode collector bar ends extending from each of said longitudinal side walls, the improvement which comprises at least one generally horizontal current collector busbar extending along each longitudinal side wall and having a horizontal axis at substantially the vertical level of said metal pad, connectors for connecting said cathode collector bar ends to said collector busbars and a plurality of current taps at points spaced along each of said longitudinal side walls for removing current from said collector busbars, said current taps being connected to said collector busbars in such positions that current flows through said collector busbars in opposite longitudinal directions on opposite longitudinal sides of each of said taps.

4,976,842

OXIDANT GENERATOR

James A. Fowler, Los Alamitos, Calif., assignor to Envirodynamics Limited, Isle of Man, United Kingdom

Filed May 1, 1989, Ser. No. 345,891

Int. Cl.[5] C25B *9/00, 15/00*

U.S. Cl. 204—252 **24 Claims**

1. An oxidant generator comprising:

a shell for containing a saline solution;

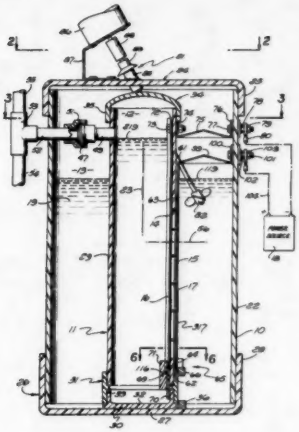
a tubular member extending generally vertically within said shell and having a side wall dividing the shell into a first chamber within the tubular member and a second chamber at the outside of said tubular member;

an anode in one of said chambers and a cathode in the other chamber to be energized by a power source for production of oxidant gases at the anode and sodium hydroxide at the cathode;

said side wall of the tubular member having a portion which curves as it advances horizontally about said first chamber and which contains at least one aperture curving with the wall and through which said chambers are in communication with one another;

an ion permeable membrane secured to said wall and bridging across said aperture and which curves essentially in correspondence with the wall and aperture and is adapted to pass sodium ions from said anode chamber to said cathode chamber while resisting movement of sodium

hydroxide from the cathode chamber to the anode chamber; and



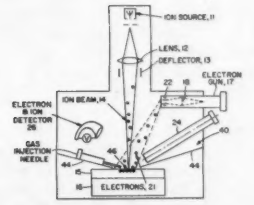
an adhesive securing the periphery of said membrane to said curving portion of said side wall about said aperture.

4,976,843

PARTICLE BEAM SHIELDING

Billy W. Ward, Rockport; David Edwards, Jr., Hamilton, and Robert A. Casella, Salem, all of Mass., assignors to Micrion Corporation, Peabody, Mass.

Filed Feb. 2, 1990, Ser. No. 474,348
Int. Cl.[5] B23K *15/00*
U.S. Cl. 204—298.36 **15 Claims**



1. Particle beam processing apparatus comprising,

a first source of a first particle beam of charged particles for impingement upon a target point within a predetermined region of a substrate surface in a predetermined surface plane,

a second source of a second particle beam of particles charged oppositely to said first particle beam, for flooding said predetermined region of said substrate surface, and

a shield comprising an electrically conductive surface located between said substrate surface and said sources of said first particle beam and second particle beam, said shield having an orifice located above said predetermined region through which said first and second particle beams can pass as said charged particles travel from said first and second sources to said predetermined region of said substrate surface,

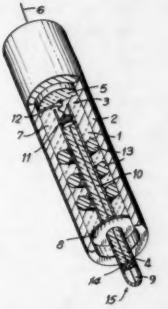
said shield being constructed to allow said first and second particle beams to travel toward said predetermined region of said substrate surface located directly below said orifice, and to prevent deflection of said second particle beam by sources of electric fields located outside said predetermined region of said substrate surface.

4,976,844

SENSOR CONSTRUCTION

Lauri Selin; Pertti Aaltonen, and Heikki Illi, all of VTT Metallilaboratorio, Kemistintie 3, SF-02150 Espoo, Finland

PCT No. PCT/FI88/00001, § 371 Date Oct. 12, 1989, § 102(e) Date Oct. 12, 1989, PCT Pub. No. WO88/08127, PCT Pub. Date Oct. 20, 1988
PCT Filed Jan. 4, 1988, Ser. No. 424,207
Claims priority, application Finland, Apr. 13, 1987, 871618
Int. Cl.[5] G01N *27/30*
U.S. Cl. 204—408 **11 Claims**



1. A sealing and insulating construction for a sensor, to be used in pressurized conditions, which construction comprises

a housing (2) which is essentially open towards the pressurized space and forms the pressure balancing chamber (1);

a tubular sensor (4) partly located within the said chamber and partly protruding therefrom;

a conductor (6) connected to the sensor and insulated from the housing of the construction, brought into the chamber by means of a leadthrough arrangement (5);

characterized in that the construction includes insulation (7) which for the most part fills the space of the chamber (1) surrounding the sensor (4), as well as a piston (8) placed around the sensor, which piston separates the insulation from the pressurized space, the said sensor being open at its chamber-side end and insulated from the housing so that an essentially equal pressure prevails both inside and outside the sensor.

4,976,845

PROCESS FOR INCREASING MESO PHASE CONTENTS IN PITCH

Peter Oerlemans, Wildzang 26, 6852 JP Huissen, Netherlands; Rolf Marrett, Eichenweg 17, 4620 Castrop-Rauxel, Fed. Rep. of Germany; Armin Eckert, Hachhausener Str. 53, 4354 Datteln, Fed. Rep. of Germany, and Klaus Altfeld, Helstr. 3, 4630 Bochum, Fed. Rep. of Germany

Filed Sep. 1, 1989, Ser. No. 403,144
Claims priority, application Fed. Rep. of Germany, Sep. 3, 1988, 3829986; Jun. 8, 1989, 3918705
Int. Cl.[5] C10C *1/00*
U.S. Cl. 208—39 **31 Claims**

1. A process for increasing the content of mesophase in a pitch, comprising the steps of using a high molecular aromatic fraction based on a material selected from the group consisting of coal tar, crude oil and their mixture in molten form, which aromatic fraction may contain mesophase, thermally treating said aromatic fraction, shaping the fraction continuously mechanically to form a thin film with a layer thickness of between substantially 0.007 and 2 cm, successively mechanically forcedly transporting the film with the use of shear forces to

provide a thorough continuous mixing through at least one homogenization zone and one degassing zone, mechanically homogenizing the film in the homogenization zone, removing readily volatile components in the degassing zone, and maintaining the temperature of the film in the homogenization zone and in the degassing zone between 320° C. and 470° C.

4,976,846

CONVERSION OF CRUDE OIL FEEDS

Gary N. Long, Putnam Valley; Regis J. Pellet, Croton-On-Hudson, and Jule A. Rabo, Armonk, all of N.Y., assignors to UOP, Des Plaines, Ill.

Continuation-in-part of Ser. No. 675,285, Nov. 11, 1984, Pat. No. 4,803,184, and a continuation-in-part of Ser. No. 37,125, Apr. 10, 1987, abandoned, which is a continuation of Ser. No. 772,616, Sep. 4, 1985, abandoned, each , said Ser. No. 675,285, and Ser. No. 772,616, is a continuation-in-part of Ser. No. 490,952, May 3, 1983, Pat. No. 4,512,875. This application Feb. 2, 1989, Ser. No. 305,166

Claims priority, application European Pat. Off., Apr. 28, 1984, 84104814.3; Australia, May 1, 1984, 84-27568; Canada, May 1, 1984, 453238-4; Japan, May 2, 1984, 59-087978; Australia, Jul. 30, 1987, 87-75099

The portion of the term of this patent subsequent to Apr. 23, 2002, has been disclaimed.

Int. Cl.[5] C10G *11/04*

U.S. Cl. 208—114 **22 Claims**

1. The process for converting a crude oil feed comprising contacting a crude oil feed at effective catalytic cracking conditions with a catalyst comprising at least one Y zeolite-based catalytic cracking catalyst and at least one non-zeolitic molecular sieve selected from the group consisting of the silicoaluminophosphates of U.S. Pat. No. 4,440,871 which are characterized in their calcined form by adsorption of at least 4 weight percent of oxygen at a partial pressure of 100 torr and a temperature of −186° C.

4,976,847

PROCESS FOR THE CATALYTIC CRACKING OF A HYDROCARBON FEEDSTOCK

Ian E. Maxwell, and Jaydeep Biswass, both of Amsterdam, Netherlands, assignors to Shell Oil Company, Houston, Tex.

Filed Aug. 24, 1989, Ser. No. 398,026

Claims priority, application United Kingdom, Aug. 26, 1988, 8820358

Int. Cl.[5] C10G *11/05*

U.S. Cl. 208—120 **14 Claims**

1. A process for the catalytic cracking of a hydrocarbon feedstock in the absence of added hydrogen, comprising contacting the feedstock with a catalyst composition comprising a zeolite I having a pore diameter larger than 0.7 and selected from zeolite Y, and a zeolite II having a pore diameter smaller than 0.7 nm and selected from a zeolite having a ZSM-5 structure, ferrierite, erionite and mixtures thereof, which composition comprises a dehydrogenating metal or metal component in an amount of from 0.5 to 20% wt based on zeolite II, at catalytic cracking conditions.

4,976,848

HYDRODEMETALATION AND HYDRODESULFURIZATION USING A CATALYST OF SPECIFIED MACROPOROSITY

David R. Johnson, San Francisco, Calif., assignor to Chevron Research Company, San Francisco, Calif.

Filed Oct. 4, 1988, Ser. No. 253,010

Int. Cl.[5] C10G *45/06, 47/02*

U.S. Cl. 208—251 H **14 Claims**

1. A process for hydrodemetalation and hydrodesulfurization of a high-boiling point, hydrocarbonaceous feed, comprising:

contacting the feed in the presence of hydrogen gas and at a temperature between 600° F. and 1000° F. and a pressure between 100 and 10,000 psig with a catalyst comprising a hydrogenation component selected from Group VI and Group VIII metals, and a refractory inorganic oxide support, and wherein the catalyst has

a. 5 to 11 percent of its pore volume in the form of macropores, and

b. a surface area greater than 75 m^2/g of catalyst.

4,976,849

FRACTIONATION PROCESS FOR GASEOUS HYDROCARBON MIXTURES WITH A HIGH ACID GAS CONTENT

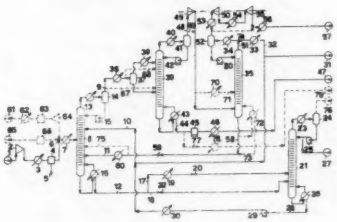
Gian F. Soldati, Milan, Italy, assignor to Snamprogetti S.p.A., Milan, Italy

Filed Sep. 20, 1988, Ser. No. 246,744

Claims priority, application Italy, Sep. 25, 1987, 22030 A/87

Int. Cl.[5] F25J *3/02*

U.S. Cl. 208—351 **34 Claims**



1. A fractionation process for gaseous hydrocarbon mixtures of high acid gas content, for separating at least a fraction containing ethane, propane and heavier hydrocarbons, a fraction containing essentially acid gases and a fraction containing essentially methane and possibly inert gases, characterized by comprising the follow stages:

(a) feeding the gaseous hydrocarbon mixture after dehydration to a first distillation column to which a heavy liquid hydrocarbon stream is fed, to obtain a gaseous overhead product stream containing methane, ethane, and acid gases and a bottom product stream containing ethane and higher hydrocarbons;

(b) feeding the overhead product of the first distillation column to a second distillation column to obtain a gaseous overhead product stream containing methane, the ethane-carbon dioxide azeotrope and possibly light inert gases, and a bottom product stream consisting essentially of acid gases;

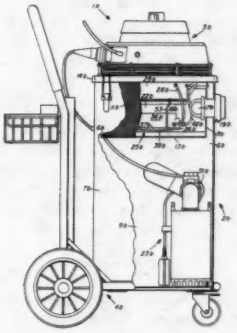
(c) feeding the overhead product of the second distillation column to a third distillation column the condenser of which is injected with a liquid hydrocarbon stream, to obtain a gaseous overhead product stream consisting essentially of methane and possibly inert gases, and a bottom product stream which is recycled to the first column and contains the ethane-carbon dioxide azeotrope and the liquid hydrocarbon stream injected into the condenser;

(d) feeding the bottom product of the first distillation column to a fourth distillation column to obtain a gaseous overhead product stream containing ethane and a bottom product stream containing higher hydrocarbons than butane.

4,976,850
SUCTION APPARATUS

Guenter Kulitz, Ulm/Donau, Fed. Rep. of Germany, assignor to ESTA Apparatebau GmbH & Co. KG, Fed. Rep. of Germany

Filed Jul. 26, 1988, Ser. No. 224,796
Claims priority, application Fed. Rep. of Germany, Jul. 30, 1987, 3725204; European Pat. Off., Dec. 17, 1987, 87118734
Int. Cl.[5] A47L *7/00*
U.S. Cl. 210—104 28 Claims

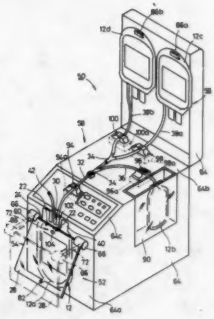


1. A suction apparatus for collecting loose material, comprising:
- a suction chamber means into which the loose material is sucked;
- a suction inlet means penetrating said suction chamber;
- a suction outlet means penetrating said suction chamber; and
- a diaphragm switch mounted on said suction apparatus with a diaphragm exposed to said suction chamber, wherein said switch is operated by contact between said diaphragm and the loose material and said switch comprises a switch casing and a pressure compensating line leading from inside said switch casing to a portion of said suction chamber above a maximum desired material level.

4,976,851
LIQUID SEPARATOR

Nobukazu Tanokura, and Susumu Fujikawa, both of Fujinomiya, Japan, assignors to Terumo Kabushiki Kaisha, Tokyo, Japan

Filed May 31, 1989, Ser. No. 359,490
Claims priority, application Japan, Jun. 6, 1988, 63-138625
Int. Cl.[5] B01D *21/36, 21/30*
U.S. Cl. 210—86 13 Claims

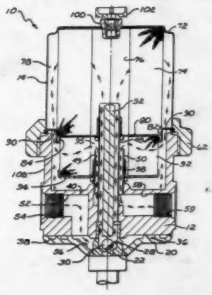


4. A liquid separator for separating a liquid layer from a first flexible container storing upper and lower liquid layers therein and having a liquid discharge tube on an upper end thereof, said liquid separator comprising:
- a first container and a second container, with said first container being flexible so as to expand its interior volume to store a quantity of liquid therein;
- a first container holder means for holding the first container with the liquid discharge tube directed substantially upwardly;
- a container presser means for pressing the first container progressively from an upper end toward a lower end thereof to force the upper liquid layer out of the first container through the liquid discharge tube;
- a second container holder means for holding said second container for storing the upper liquid layer delivered from the liquid discharge tube through a passage;
- opening/closing means for selectively opening and closing said passage;
- an interface sensor means for detecting an interface separating the upper and lower liquid layers in the first container; and
- a control unit means for generating control signals based on a detected signal from said interface sensor means and a predetermined control program stored in said control unit means, and for applying said control signals to said container presser means and said opening/closing means to automatically separate the upper liquid layer from said first container and deliver the upper liquid layer into said second container.

4,976,852
FUEL FILTER

Leon P. Janik, Suffield, and M. Craig Maxwell, Colchester, both of Conn., assignors to Stanadyne Automotive Corp., Windsor, Conn.

Filed Jun. 28, 1989, Ser. No. 372,645
Int. Cl.[5] B01D *27/08*
U.S. Cl. 210—86 20 Claims



18. A fuel filter assembly comprising:
- base means comprising a base having a fuel inlet passage, a fuel outlet passage, central first conduit means for interiorly defining a first axial passage communicatable with said inlet passage and second conduit means surrounding said first conduit means for defining a second axial passage communicating with said outlet passage, said base means comprising sump means for collecting water;
- filter cartridge means mountable on said base means for removing particulate matter and water from fuel, said cartridge means comprising:
  - housing means comprising a first endcap defining first opening means for receiving said first conduit means in fluid tight relationship;
  - primary filter means enclosed in said housing means comprising a folded primary filter element having water

coalescing properties defining a first chamber communicating with said first axial passage and a second chamber surrounding said first chamber;

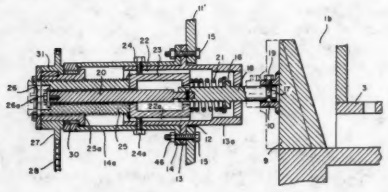
secondary filter means comprising a second endcap defining second opening means for receiving said second conduit means in fluid tight relationship and comprising a secondary filter element which is generally impervious to the passage of water extending exteriorly of said housing means between said first and second endcaps and defining with said base means a third chamber and a fourth chamber surrounded by said third chamber, said third chamber communicating with said second chamber and said sump means, said fourth chamber communicating with said second axial passage.

4,976,853

CONTROL VALVE MEANS FOR USE IN A FILTRATION APPARATUS FOR TREATING WASTE PRODUCT

Chung Y. Lee, 375-21, Daekang-Dong, Dongjak-Ku, Seoul, Rep. of Korea

Filed Feb. 2, 1989, Ser. No. 305,436
Int. Cl.[5] B01D *33/06*
U.S. Cl. 210—107 **10 Claims**



1. A filtration apparatus for the treatment of liquid containing waste product which comprises:

a housing means,

a rotary filtration cylinder disposed in said housing means and having a surface which contains means defining a plurality of apertures for receiving waste product to be treated and filtered,

tapered rotary cylinder rotatably disposed within said rotary filtration cylinder for rotating and conveying said waste product, wherein said rotary filtration cylinder and said tapered rotary cylinder define a treatment zone therebetween,

waste product inlet means operatively associated with said housing means and said rotary filtration cylinder for introducing waste product to be treated into said treatment zone,

waste product outlet means operatively associated with said housing means and said rotary filtration cylinder for removing waste material that has been treated from said treatment zone,

steam supplying means operatively associated with said housing means,

steam injection means fluidly communicating with said steam supplying means and said tapered rotary cylinder for introducing hot steam from said steam supplying means into the interior of said tapered rotary cylinder, wherein said tapered rotary cylinder is heated thereby heating said treatment zone and said waste material therein,

a fixed steam cleaning pipe disposed in said housing means, in the vicinity of the outside of said rotary cylinder, and fluidly communicating with said steam supplying means, said fixed steam cleaning pipe having a plurality of nozzles for spraying and washing clean said rotary filtration cylinder through said nozzles with steam from said steam supplying means,

a plurality of control valve members disposed within said outlet, one of said plurality of control valve members including:

a control valve for opening and closing an opening of said outlet,

a connecting bar connected to said control valve at one end thereof and wound with a coil spring,

a hollow piston connected to said coil spring,

a hollow male screw connected to said hollow piston,

a movable bar connected to the other end of said connecting bar at one end thereof and connected to said hollow male screw at the other end thereof,

a female screw operatively mating with said male screw,

a sprocket attached to said female screw, and

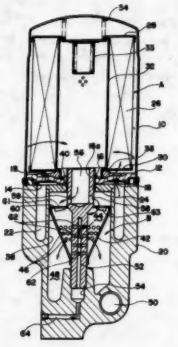
a bidirectional rotating motor connecting to said sprocket through a chain, and adapted for rotation in clockwise and counterclockwise directions by operation of a switch, and adapted to cause the female screw moves backward and forward through the chain and the sprocket, to the movable bar to move backward and forward through the male screw and therafter the control valve to move backward and forward through the connecting bar, the control valve easily controlling the pressure in the treatment zone.

4,976,854

OIL FILTER II

Hisashi Yano, Yokohama; Junsuke Yabumoto, Atsugi, and Ryuzi Kuwavara, Yokohama, all of Japan, assignors to Mitsubishi Oil Co., Ltd., Tokyo, Japan

Filed Oct. 11, 1989, Ser. No. 420,048
Claims priority, application Japan, Apr. 25, 1989, 1-47649[U]
Int. Cl.[5] B01D *19/00*
U.S. Cl. 210—168 **18 Claims**



1. An oil filter comprising:

a housing opened at one end thereof;

a first separator unit disposed in said housing for removing solid contaminants from the oil introduced into said housing, said first separator unit including a cylindrical filter element having an inner periphery and a central space defined within the inner periphery;

a mount block to which said housing is attached, said mount block having formed therein a recess and an inlet passage for supplying the oil into said housing; and

a second separator unit disposed in said recess of said mount block for removing gaseous contaminants from the oil that has passed through said filter element, said second separator unit including a chamber having means for generating a vortical flow of the oil introduced therein to thereby separate gas-rich oil which gathers in an axially central portion of said chamber, means for introducing the oil from said central space of said first separator unit to said chamber, a first outlet means for leading the oil containing little gaseous contaminants outside said mount block and a

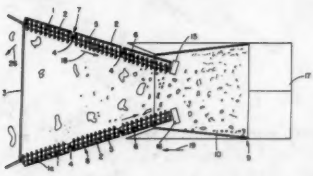
second outlet means for discharging said gas-rich oil outside said mount block.

4,976,855

OIL COLLECTING VESSEL

Kalervo Virtanen, Metsäpekkalantie 2, 15610 Lahti, Finland

Filed Apr. 14, 1989, Ser. No. 339,185
Int. Cl.[5] E02B *15/04*
U.S. Cl. 210—242.3 3 Claims



3. An oil collecting apparatus for removing oil from the surface of water, comprising: a vessel, at least two oil booms arranged in front of the vessel in V-shaped, the oil booms comprising buoyant screwlike draw booms arranged to rotate so as to draw surface water and oil into a receiver provided in the vessel, simultaneously displacing the vessel forward; and boundary booms provided in parallel with the draw booms so as to lead the surface water displaced by the draw dooms into the receiver in the vessel; wherein each of said draw booms comprises a plurality of draw boom segments connected in series by universal joints.

4,976,856

PROCESS FOR PREPARING NON-POROUS, SELECTIVE MEMBRANE LAYERS

Albert Van Der Scheer, Sittingbourne, United Kingdom, and Jan Werner, Amsterdam, Netherlands, assignors to Shell Oil Company, Houston, Tex.

Filed Mar. 13, 1989, Ser. No. 322,449
Claims priority, application United Kingdom, Mar. 21, 1988, 8806674
Int. Cl.[5] B01D *69/12*
U.S. Cl. 210—490 15 Claims

1. A process for preparing non-porous selective membrane layers which comprises contacting a permeable continuous substrate with the glowing zone of a plasma generated using a hydrocarbonaceous compound under plasma polymerization conditions wherein a hydrocarbonaceous layer is formed on said substrate.

15. A membrane comprising a membrane layer prepared according to the process of claim 1.

4,976,857

FILTER ELEMENT AND FABRICATION METHODOLOGY

Donald F. Solomon, Hemet, Calif., assignor to Newport Filters, Inc., Hemet, Calif.

Filed May 3, 1989, Ser. No. 347,153
Int. Cl.[5] B01D *29/07*
U.S. Cl. 210—493.5 9 Claims

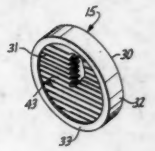
1. A filter element, comprising:

a porous member having pleats;

an annular support member;

the support member having an opening, a peripheral wall and first and second axially spaced shoulders extending radially inwardly from the peripheral wall to define a radially inwardly opening cavity;

the porous member being mounted on the support member in the cavity and with the pleats being between the first and second shoulders and with the porous member in a position extending across the opening; and



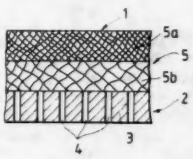
the porous member being pleated to provide a plurality of pleats extending transversely across the opening in order to provide increased surface area for a given cross sectional area of the opening.

4,976,858

MULTI-LAYER FILTER MEDIUM

Teruichi Kadoya, Shizuoka, Japan, assignor to Toyo Roki Seizo Kabushiki Kaisha, Shizuoka, Japan

Continuation of Ser. No. 230,555, Aug. 10, 1988, abandoned.
This application Feb. 1, 1990, Ser. No. 473,144
Claims priority, application Japan, Aug. 12, 1987, 62-199918; Aug. 12, 1987, 62-199919
Int. Cl.[5] B01D *39/14*
U.S. Cl. 210—496 4 Claims



3. A filter which has a filter medium for an oil filter or an air filter for an internal combustion engine to remove dust particles from a fluid to be filtered; said filter medium comprising a nonwoven fabric of a lower fiber density which comprises at least two layers, and a filter paper of a higher fiber density, said nonwoven fabric and said filter paper being superposed in a laminated structure, one of said layers of the nonwoven fabric, which is closer to said filter paper, having a fiber density lower than that of the other of said layers of the nonwoven fabric which is located opposite to said filter paper with respect to the one of said layers, the one of said layers being a thermally fusible layer, said nonwoven fabric and said filter paper being joined together through the thermally fusible layer of the nonwoven fabric, said filter medium being arranged such that said nonwoven fabric and said filter paper are disposed upstream and downstream, respectively, in a direction in which said fluid to be filtered flows.

4,976,859

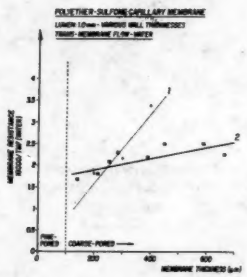
INTEGRAL ASYMMETRIC POLYETHER-SULFONE MEMBRANE, PROCESS FOR ITS PRODUCTION, AND USE FOR ULTRAFILTRATION AND MICROFILTRATION

Friedbert Wechs, Wörth, Fed. Rep. of Germany, assignor to Akzo N.V., Netherlands

Filed Sep. 1, 1989, Ser. No. 401,859
Claims priority, application Fed. Rep. of Germany, Sep. 1, 1988, 3829752
Int. Cl.[5] B01D *71/68*
U.S. Cl. 210—500.23 20 Claims

1. An integral polyether-sulfone membrane having properties sufficient for allowing a flow of fluid therethrough which

is largely independent of membrane thickness, said membrane having two surfaces and comprising a pore diameter of 0.02μm to 2 μm, measured by the blow point method, wherein the pore system is cellular throughout with cells having polyhedrally symmetrical boundaries and the cells being arranged asymmetrically from one surface of the membrane to the other surface, as asymmetry factor AF relative to the maximum pore diameter being 0.01 to 2.0, and a ratio of a maximum mean free path length of a flow path to a diameter of the largest pore being greater than 3, and a cell size changing steadily from one surface to the other surface.



4,976,860

CONJUGATED POLYMER-CATION EXCHANGER COMPOSITE MEMBRANE

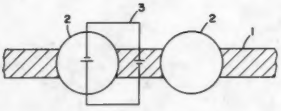
Hiromichi Takahashi, Sennan, and Kaoru Tsujii, Wakayama, both of Japan, assignors to KAO Corporation, Tokyo, Japan

Filed Aug. 4, 1988, Ser. No. 228,314

Claims priority, application Japan, Aug. 4, 1987, 62-195481

Int. Cl.[5] B01D *71/44*

U.S. Cl. 210—500.28 **5 Claims**



1. A conjugated polymer-cation exchanger composite membrane which consists essentially of a conjugated polymer and cation exchangers dispersed therein, said conjugated polymer being selected from the group consisting of polypyrrole, polythiophene, polyfurane, polyselenophene, polyaniline, polypyridazine, polyazophenylene, poly-p-phenylene, polynaphthalene, polyanthracene, polyacetylene, polyacene, poly-p-phenylenevinylene or a substituted derivative thereof.

4,976,861

METHOD FOR DETERMINING THE WETTING CHARACTERISTIC OF A POROUS MEDIUM

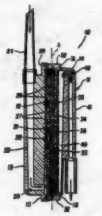
David B. Pall, Roslyn Estates, N.Y., assignor to Pall Corporation, Glen Cove, N.Y.

Division of Ser. No. 259,773, Oct. 19, 1988, Pat. No. 4,925,572, which is a continuation-in-part of Ser. No. 110,413, Oct. 20, 1987, abandoned, and a continuation-in-part of Ser. No. 218,169, Jul. 13, 1988, abandoned. This application Mar. 2, 1990, Ser. No. 487,268

Int. Cl.[5] B01D *39/16*; G01N *33/00*

U.S. Cl. 210—508 **7 Claims**

1. A method for determining the wetting characteristic of a porous medium comprising applying at least one or more drops of each of at least two different liquids having different but closely spaced surface tensions to different locations on the



porous medium and if necessary repeating of this process until, of two liquids with neighboring surface tension, one is absorbed into the medium, and the other is not.

4,976,862

PROCESS FOR EXTRACTION AND RECOVERY OF BLOWING AGENTS FROM POLYMERIC FOAMS

Michael R. Ascough, Oakville, and James A. Bueley, Iroquois, both of Canada, assignors to Dupont Canada Inc., Mississauga, Canada

Filed Apr. 10, 1989, Ser. No. 335,947

Int. Cl.[5] B01D *53/04*

U.S. Cl. 210—656 **32 Claims**

1. A process for removing blowing agent from polymeric foam, said process comprising: breaking up said foam in a liquid medium to obtain a solid phase of polymeric fragments and a liquid phase of blowing agent, and liquid medium; and separating said polymeric fragments from said liquid phase.

4,976,863

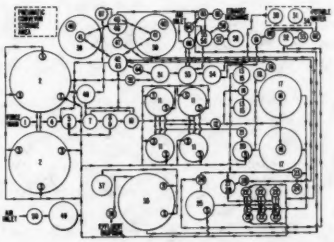
WASTEWATER TREATMENT PROCESS

Donald M. Stearns, Cocoa, Fla., assignor to PEC Research, Inc., Sharpes, Fla.

Filed Jan. 26, 1989, Ser. No. 301,463

Int. Cl.[5] C02F *3/30*

U.S. Cl. 210—608 **13 Claims**



1. A process for treating wastewater containing insoluble solid waste material and soluble solid waste material comprising the following series of steps:

controlling the oxygen content of said wastewater to a level at which growth of anaerobic bacteria is substantially eliminated and growth of aerobic bacteria is minimized;

separating said insoluble solid waste material from said wastewater;

treating said soluble solid material in said wastewater with a predetermined amount of aerobic bacteria; and

reducing the amount of aerobic bacteria in said wastewater.

4,976,864

TREATMENT OF THE EFFLUENTS FROM THE PRODUCTION OF EPOXY RESINS

Agostino Baradel, San Donato Milanese; Gino Della Penna; Silvio Gulinelli, both of Rome; Mario Valdiserri, Monterotondo, and Andrea Robertiello, Rome, all of Italy, assignors to Enitricerche S.p.A., Milan, Italy

Filed Oct. 6, 1989, Ser. No. 418,227
Claims priority, application Italy, Oct. 7, 1988, 22221 A/88
Int. Cl.[5] C02F 3/28, 1/469
U.S. Cl. 210—610 7 Claims

1. A process for treating aqueous effluents from the production of epoxy resins, wherein the aqueous effluents comprise at least one chlorohydrin, glycidol, isopropyl alcohol and sodium chloride, wherein the process comprises:

(a) hydrolytically treating the effluents under alkaline conditions so that epichlorohydrin is reduced from about 4100 ppm to about 75 ppm and glycidol is reduced from about 9600 ppm to about 4000 ppm;

(b) removing about 90% of the sodium chloride from said hydrolyzed effluent;

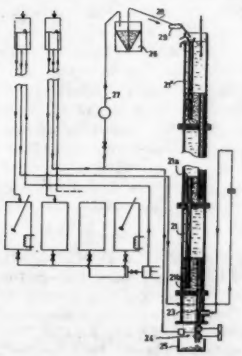
(c) diluting the concentration of epichlorohydrin, glycidol, and sodium chloride respectively, in said hydrolyzed effluent from step (b) followed by neutralizing said hydrolyzed effluent with sources of nitrogen and phosphorous, then anaerobically digesting said diluted neutralized hydrolyzed effluent.

4,976,865

METHOD FOR THE SEPARATION OF BIOLOGICAL MACROMOLECULES BY CHROMATOGRAPHY

Victor Sanchez, Ramonville Saint Agne; Beatrice Biscans, Escalquens; Jean-Pierre Couderc, and Jean-Pierre Riba, both of Toulouse, all of France, assignors to Centre National de la Recherche Scientifique, Paris, France

Continuation-in-part of Ser. No. 816,114, Jan. 3, 1986, abandoned. This application Oct. 22, 1987, Ser. No. 112,312
Claims priority, application France, Jan. 4, 1985, 85 00643
Int. Cl.[5] B01D 15/08
U.S. Cl. 210—635 11 Claims



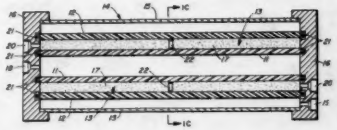
1. A method for the chromatographic separation of biological macromolecules on an industrial scale having a molecular weight of greater than 5,000, having a tendency to autodenaturation, and selected from the group consisting of proteins, enzymes, toxins and anti-bodies in solution for performing a selective adsorption comprising providing a quantity of selective chromatographic resins specific to the macromolecules to be separated and having a mean granulometry G_m and a voluminal mass M_y so related as to fall within non-hatched Zone Z in the graph of FIG. 1; providing a chromatographic column with at least one stage having at its base a perforated distribution system with open sections between about 0.02% and 10%, said open sections having a mean diameter greater than about 300 microns and within the range of 2 G_m and 20 G_m; placing said chromatographic resin in said chromatographic column so as to form a bed; supplying a flow of said solution through said distribution system to said chromatographic column in such a manner as to fluidize said bed and adjusting said flow so as to obtain a linear liquid speed in said column of between about 1.5 V_{mf} and 12 V_{mf} where V_{mf} is the minimum fluidization speed of said resin.

4,976,866

CONCENTRIC TUBULAR MEMBRANE DEVICE AND PROCESS USEFUL IN ION EXCHANGE OR ABSORBENT PROCESSES

Robert R. Grinstead, and H. Hunter Paalman, both of Walnut Creek, Calif., assignors to The Dow Chemical Company, Midland, Mich.

Filed Apr. 3, 1989, Ser. No. 332,927
Int. Cl.[5] C02F 9/00
U.S. Cl. 210—638 23 Claims



1. A membrane separation device useful for carrying out an ion exchange or absorbent process comprising:

A. a housing comprising a case and two endplates;

B. a first microporous tubular membrane defining within it a volume region;

C. a second microporous tubular membrane wherein the first tubular membrane is concentrically situated inside the second tubular membrane such that a first annular region between the first and second tubular membranes is formed;

D. fine size ion exchange or absorbent particles having a size of between about 10 and 100 microns disposed within the first annular region formed by the first and second concentrically situated tubular membranes;

D'. a second annular region defined between the interior wall of the case and the exterior convex surface of the second microporous tubular membrane;

E. first opening means in fluid communication with said volume region within the first microporous tubular membrane for either introducing a feed fluid into the volume region or for withdrawing treated fluid from the volume region;

E'. second opening means in fluid communication with said second annular region for either introducing a fluid feed into the second annular region or for withdrawing treated fluid from the second annular region;

F. a means of sealing the first and second tubular membranes to the inside surface of the housing; and

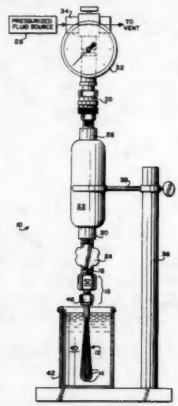
G. at least one porous spacer situated between the first and second concentrically situated tubular membranes.

4,976,867

SYSTEMS AND METHODS FOR PREDETERMINING MAXIMUM PRESSURE DIFFERENTIALS FOR MICROPOROUS HOLLOW FIBERS EMPLOYED IN LIQUID-LIQUID EXTRACTIONS

Robert W. Callahan, Charlotte, and Bradley W. Reed, Gastonia, both of N.C., assignors to Hoechst Celanese Corporation, Somerville, N.J.

Filed Apr. 5, 1989, Ser. No. 333,410
Int. Cl.[5] B01D *65/10*
U.S. Cl. 210—637 **17 Claims**



11. A method of determining a maximum pressure above which a feed liquid is expelled through pores of a microporous hollow fiber, said method comprising the steps of:

(a) forming a number of microporous hollow fibers into a loop between opposing ends thereof;

(b) establishing fluid communication between central lumens of said hollow fiber loops and a pressurized source of said feed liquid;

(c) immersing the loops of hollow fibers in an extractant liquid which is essentially immiscible with said feed liquid;

(d) continually increasing the pressure of said feed liquid until there is an incipient presence of said feed liquid in said extractant liquid; and then

(e) establishing the increased pressure at which said incipient presence of said feed liquid in said extractant liquid occurs thereby to determine said maximum pressure above which said feed liquid is expelled through the pores of said microporous hollow fibers.

4,976,868

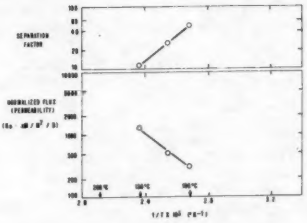
POLYESTER MEMBRANES FOR AROMATICS/SATURATES SEPARATION

Guido Sartori, and W. S. Winston Ho, both of Annandale, N.J., assignors to Exxon Research and Engineering Company, Florham Park, N.J.

Filed Oct. 16, 1989, Ser. No. 422,216
Int. Cl.[5] B01D *61/36*
U.S. Cl. 210—640 **3 Claims**

1. A method for separating mixtures of aromatics and non-aromatics into aromatic-enriched and non-aromatic-enriched streams comprising:

(a) contacting said aromatics/non-aromatics mixture with one side of a membrane consisting essentially of a polyester, and



(b) selectively permeating the aromatic components of the mixture through the membrane.

4,976,869

COMPOSITE SEMIPERMEABLE MEMBRANES AND METHOD OF MAKING SAME

John A. Taylor, Pinckney, Mich., assignor to Separation Dynamics, Inc., Southfield, Mich.

Division of Ser. No. 240,632, Sep. 6, 1988, Pat. No. 4,872,982.
This application May 22, 1989, Ser. No. 354,707
Int. Cl.[5] B01D *61/24*
U.S. Cl. 210—644 **4 Claims**

1. A method of preparing a mixture of a water soluble substance and a hydrocarbon fluid across a membrane (**10**, **10'**) having water on one side of the membrane (**10**, **10'**), said method including the steps of:

dissolving a water soluble substance in water; selectively permeating the water soluble substance through a substantially hydrophobic layer (**14**) covalently bonded to a semipermeable non-porous layer (**12**) of a hollow fiber membrane (**10**); selectively permeating the water soluble substance through the non-porous layer (**12**) of the membrane (**10**); and removing the water soluble substance from the non-porous layer (**12**) and into the hydrocarbon fluid.

4,976,870

WASH WATER RESERVOIRING METHOD

Haruo Takase; Kazushige Uenaka, both of Tokyo; Akira Abe, and Yoshihiro Fujita, both of Kanagawa, all of Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Division of Ser. No. 155,454, Feb. 12, 1988, Pat. No. 4,857,950.
This application May 26, 1989, Ser. No. 358,285
Claims priority, application Japan, Feb. 13, 1987, 62-30782; Feb. 14, 1987, 62-32184
Int. Cl.[5] C02F *1/68*
U.S. Cl. 210—668 **2 Claims**

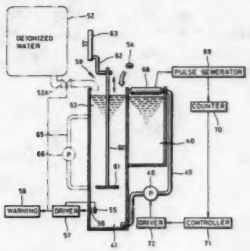
1. A method for replenishing a wash tank with fresh wash water for washing photographic materials after development, comprising:

deionizing a fresh supply of water to obtain deionized wash water;

supplying a predetermined quantity of said deionized fresh wash water to said wash tank; and

adding a tablet comprising a predetermined dose of both a conductivity increasing agent and a sterilizer into said

wash tank every time said predetermined quantity of said deionized fresh water, is supplied to said wash tank,



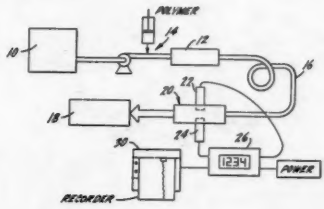
thereby increasing the conductivity and sterilizing said wash water for washing said photographic materials.

4,976,871

METHOD OF MONITORING FLOCCULANT EFFECTIVENESS

Rodney H. Banks, and Jitendra T. Shah, both of Naperville, Ill., assignors to Nalco Chemical Company, Naperville, Ill.

Filed Oct. 17, 1989, Ser. No. 422,618
Int. Cl.[5] C02F 1/52
U.S. Cl. 210—709 **6 Claims**



1. A method of determining the effectiveness of a flocculant to collect suspended particles into larger agglomerates separated by clear water areas in a moving body of an aqueous sludge, in which effectiveness is proportional to the ratio of clear water areas to agglomerate areas, comprising the steps of

employing a probe to transmit a light beam through the moving body to a sensor probe incorporating a transducer which converts the intensity of the light beam to a voltage analog waveform having high (HI) peaks for clarified water areas crossed by the beam and low (LO) dips for agglomerates passing through the beam;

transmitting the analog waveform to a comparator having a low voltage threshold bias resulting in a series of digitized output pulses corresponding only to the HI wave pulses; and counting HI wave pulses per unit of time to determine the effectiveness of said flocculant in forming said agglomerates.

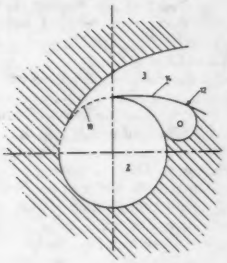
4,976,872

CYCLONE SEPARATOR

Mark I. Grey, South Yarra, Australia, assignor to Conoco Specialty Products Inc., Houston, Tex.

Continuation of Ser. No. 271,858, Aug. 26, 1988. This application Feb. 13, 1990, Ser. No. 479,794
Int. Cl.[5] C02F 1/00; B01D 19/00
U.S. Cl. 210—739 **17 Claims**

12. A method for separating a denser liquid component from a less dense liquid component of a multi-phase liquid mixture in a cyclone separator, with one liquid phase being in the form of droplets dispersed in another liquid phase, and with the distribution of such droplets in the mixture being determinative of the efficiency of the operation of the separator, wherein the cyclone separator is comprised of an axially extending separation chamber having a feed inlet at one end for admission of the mixture into the separation chamber, control means for varying the cross-sectional area of the feed inlet, and an outlet adjacent the other end of the separating chamber, the method comprising the steps of:



feeding the multi-phase mixture having liquid droplets into the feed inlet at the one end,

detecting the concentration of the one phase of liquid droplets in the other liquid phase,

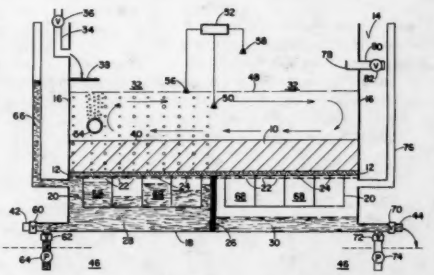
operating the control means in response to the liquid droplet concentration determination to vary the cross-sectional area of the feed inlet and thereby maintain the operational efficiency of the separator at a high level.

4,976,873

PULSING PORTIONS OF A FILTER CELL TO EXTEND A FILTER RUN

David S. Ross, Lorain, Ohio, assignor to Zimpro/Passavant Inc., Rothschild, Wis.

Filed Dec. 14, 1989, Ser. No. 450,934
Int. Cl.[5] C02F 1/00
U.S. Cl. 210—744 **20 Claims**



1. A method for removing solids from an influent liquid during periods of high volumetric influent flow during a filtration time in a filtration cycle, by passage of said liquid through a down-flow granular medium filter bed in a filter tank cell, said filter bed having an upper surface and a lower surface, and made up of a plurality of subcells, each subcell individually adapted and controlled for periodic upwardly directed pulses of fluid from an array of orifices therein at times other than during backwashing, comprising the steps:

(a) continuously introducing said influent liquid into said

filter tank cell for downward solids-removing passage through said filter bed;

(b) allowing liquid in said filter tank cell to rise to a pulse cycle initiating level above said upper surface of said filter bed during the filtration time;

(c) activating a first selected subcell of said filter cell for a pulsing cycle upon the level of liquid above the filter bed exceeding said pulse cycle initiating level, said pulsing cycle comprising intermittent upwardly-directed multiple pulses of a fluid through that portion of the filter bed within said selected subcell from said array of orifices therein, to dislodge solids from said upper surface of said bed within said subcell, store filtered solids within that portion of the filter bed, and increase the passage of liquid through that portion of the bed within said subcell, thereby minimizing the liquid level rise above said upper surface of said filter bed;

(d) activating a second selected subcell of said filter cell for a pulsing cycle, said pulsing cycle comprising intermittent upwardly-directed multiple pulses of a fluid through that portion of the filter bed within said selected subcell from said array of orifices therein, to dislodge solids from said upper surface of said bed within said subcell, store filtered solids within that portion of the filter bed, and increase the passage of liquid through that portion of the bed within said subcell, thereby minimizing the liquid level rise above said upper surface of said filter bed;

(e) allowing liquid in said filter tank cell to rise to a backwash cycle initiating level, greater than said pulse cycle initiating level, during the filtration time;

(f) ceasing the introduction of influent liquid into said filter tank cell; and

(g) backwashing said filter bed at an upwardly cleansing velocity after completion of two or more said pulsing cycles.

4,976,874

CONTROL OF BIOFOULING IN AQUEOUS SYSTEMS BY NON-POLYMERIC QUATERNARY AMMONIUM POLYHALIDES

James E. Gannon, Cleveland, Minn., and Scott Thornburgh, West Lafayette, Ind., assignors to Great Lakes Chemical Corporation, West Lafayette, Ind.

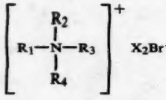
Division of Ser. No. 48,902, Apr. 20, 1987, abandoned, which is a continuation-in-part of Ser. No. 911,183, Sep. 24, 1986, abandoned. This application May 18, 1989, Ser. No. 353,830

Int. Cl.[5] C02F *1/76*

U.S. Cl. 210—755 **6 Claims**

1. In a method for controlling biofouling in an aqueous system which comprises the step of delivering biocidally active halogen to the aqueous system, the improvement comprising:

delivering biocidally active halogen to the system by introducing to the system at a frequency, duration and concentration sufficient to control biofouling in the system a water soluble composition comprising a quaternary ammonium polyhalide of the formula:



wherein each substituent R_1, R_2, R_3, and R_4 is independently selected from the group consisting of hydrogen, alkyl, alkyl ether, cyclic alkyl and hydroxyethyl; wherein said alkyl has between 1 and 10 carbon atoms, wherein at least two or more of the R_1, R_2, R_3 and R_4 substituents have between 8 and 10 carbon atoms; wherein no more than one of the substituents R_1, R_2, R_3, and R_4, is hydrogen; and wherein each X is independently selected from the group consisting of chlorine, bromine and iodine wherein the polyhalide is provided in admixture with an effective amount of a surfactant selected from the group consisting of poly (oxyethylene)/poly (oxypropylene) block copolymers, ethoxylated alkyl phenols, phosphate esters, glycol esters, quaternary ammonium surfactants, aliphatic phosphate ester/ethylene oxide adducts and mixtures thereof, to formulate said water soluble composition and wherein the monohalide which results from reduction of the polyhalide is also biocidal.

4,976,875

METHOD OF AND APPARATUS FOR SEPARATING A MEDIUM IN DIFFERENT COMPONENTS BY MEANS OF GRAVITY

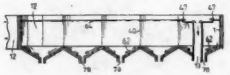
Seppo I. Ryynänen, Kuopio, Finland, assignor to Lisop Oy, Kerava, Finland

Continuation of Ser. No. 104,052, Oct. 28, 1987, abandoned. This application Apr. 19, 1989, Ser. No. 341,313

Claims priority, application Finland, Feb. 12, 1986, 860637

Int. Cl.[5] B01D *17/032, 17/038, 17/025;* B04C *7/00*

U.S. Cl. 210—788 **14 Claims**



1. A method of separating to a desired degree a liquid medium into heavy and light components by means of gravity, comprising the steps of:

rotating the liquid medium in a first vertical rotational pattern having a combination of vertical height and angular velocity sufficient to allow gravity to separate some of the heavy component from the light component by settling some of the heavy component out of the liquid medium, wherein said angular velocity is so slow that centrifugal effects on separation of the heavy and light components are negligible and turbulence is not generated in the liquid medium sufficient to cause mixing of any heavy component settled out of the liquid medium with said light component, yet sufficiently fast to collect any heavy component settled out of the liquid medium at the bottom center of the rotational pattern;

rotating the liquid medium in at least one additional like rotational pattern until the desired degree of separation of said heavy and light components is achieved, wherein each of said first and additional like rotational patterns contacts at least one other of said first and additional like rotational patterns in the horizontal direction;

removing said heavy component settled out of the liquid medium from the bottom center of each of said first and additional like rotational patterns; and

removing said light components from the top of at least one of said first and additional like rotational patterns.

4,976,876

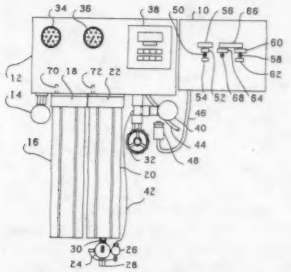
POINT-OF-USE MEMBRANE FILTRATION SYSTEM

Charles Diman, Billerica; David Marcus, Newton; Philip Mitchell, East Walpole, and Baruch Sachs, Brookline, all of Mass., assignors to The Kendall Company, Mansfield, Mass.

Division of Ser. No. 167,658, Mar. 14, 1988, Pat. No. 4,898,667. This application Nov. 28, 1989, Ser. No. 442,298

Int. Cl.[5] B01D *24/46*

U.S. Cl. 210—791 7 Claims



1. A method of filtering liquid comprising the steps of: providing a short interval purging sequence of steps to augment a longer interval purging sequence of steps by directing liquid through a filtration cartridge; drawing off filtered product from a downstream side of the filter cartridge; and automatically drawing off a predetermined volume percentage of reject product quantity from the upstream side of the filtration cartridge and in direct response to the drawing off of filtered liquid product.

4,976,877

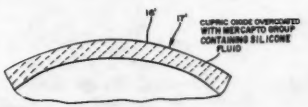
CERAMIC CUPRIC OXIDE COATED PRESSURE ROLL FOR IMAGE FIXING

John A. Agostinelli, Rochester, and William J. Staudenmayer, Pittsford, both of N.Y., assignors to Eastman Kodak Company, Rochester, N.Y.

Filed Sep. 15, 1989, Ser. No. 408,180

Int. Cl.[5] G03G *15/20*

U.S. Cl. 219—216 7 Claims



1. In a fuser roll of the class adapted for fusing thermoplastic resin toner powder images to a substrate sheet at elevated temperatures and having outer circumferential surface portions, the improvement which comprises a coating over said circumferential surface portions consisting essentially of ceramic cupric oxide, said coating being overcoated with a chemically bound layer of a mercapto group containing silicone fluid.

4,976,878

PROCESS FOR RECOVERING GELLED AQUEOUS LIQUID FABRIC SOFTENER

Timothy W. Coffindaffer, Loveland, Ohio, assignor to The Procter & Gamble Company, Cincinnati, Ohio

Filed Jan. 18, 1990, Ser. No. 466,901

Int. Cl.[5] D06M *11/00, 13/00;* B01D *17/04*

U.S. Cl. 252—8.6 22 Claims

1. A process for treating gelled aqueous liquid fabric softener composition, that was originally in the form of a stable dispersion of relatively water insoluble softening active in aqueous medium, to recover said composition by reforming a stable dispersion, comprising the steps of heating said composition to a temperature at least about its Krafft temperature and applying shear to reform a stable dispersion.

4,976,879

SULFOAROYL END-CAPPED ESTER OLIGOMERS SUITABLE AS SOIL-RELEASE AGENTS IN DETERGENT COMPOSITIONS AND FABRIC-CONDITIONER ARTICLES

Rene Maldonado, Holland, Pa.; Toan Trinh, Mainville, and Eugene P. Gosselink, Cincinnati, all of Ohio, assignors to The Procter & Gamble Company, Cincinnati, Ohio

Division of Ser. No. 105,421, Oct. 5, 1987. This application Aug. 28, 1989, Ser. No. 399,727

Int. Cl.[5] C11D *3/34;* C07C *307/28;* D06M *13/256*

U.S. Cl. 252—8.7 3 Claims

1. A method of laundering fabrics and concurrently providing a soil release finish thereto, comprising contacting said fabrics with an aqueous laundry liquor containing conventional detersive ingredients and from about 1 to about 50 ppm of a soil release agent which is an oligomeric or polymeric composition comprising at least 10% by weight of a substantially linear, sulfoaroyl end-capped ester having a molecular weight ranging from about 500 to about 20,000; wherein said ester consists essentially of, on a molar basis,

(i) from about 1 to about 2 moles of sulfobenzoyl end-capping units of the formula $(MO_3S)(C_6H_4)C(O)$— wherein M is a salt-forming cation;

(ii) from about 2 to about 50 moles of oxy - 1, 2-propyleneoxy units of mixtures thereof with oxyethyleneoxy units provided that the oxy - 1, 2-propyleneoxy: oxyethyleneoxy mole ratio is in the range from about 1:10 to about 1.0; and

(iii) from about 1 to about 40 moles of terephthaloyl units provided that the mole ratio of said units identified by (ii) and (iii) is from about 2:1 to about 1:24.

4,976,880

LUBRICATING RUBBER COMPOSITION

Fuminori Satoji, Kuwana, Japan, assignor to NTN -Rulon Industries, Co. Ltd., Tokyo, Japan

Division of Ser. No. 304,290, Jan. 31, 1989. This application May 7, 1990, Ser. No. 520,322

Int. Cl.[5] C10M *107/50, 107/54*

U.S. Cl. 252—12 7 Claims

1. A lubricating rubber composition comprising:

a diene rubber; and

one having at least one group selected from the group consisting of isocyanate group and cyanate group wherein said organopolysiloxane is present in 3–100 parts by weight per 100 parts by weight of diene rubber.

4,976,881

COUPLED POLYAMINE LUBRICANT ADDITIVES DERIVED FROM HYDROCARBYL POLYNITRILES AND POLYAMINES

Paul E. Adams, Willoughby Hills, Ohio, assignor to The Lubrizol Corporation, Wickliffe, Ohio

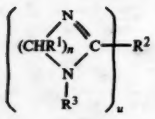
Division of Ser. No. 853,575, Apr. 19, 1996, Pat. No. 4,906,392. This application Aug. 30, 1989, Ser. No. 400,651

Int. Cl.[5] C10M *133/46*

U.S. Cl. 252—47 6 Claims

1. A composition comprising a major amount of an oil of lubricating viscosity and a minor amount of an additive prepared by reacting:

(A) at least one reactant of the formula:



(I)

wherein n is 2–7; R^2 is hydrocarbyl; R^3 and each R^1 independently is hydrogen, alkyl, $(Y—NR^4)_xR^5$, wherein x is 1 to about 100, Y is alkylene of 1 to about 7 carbon atoms or a heterocyclic nitrogen containing cycloalkylene of 2 to about 10 carbon atoms, R^4 is hydrogen, alkyl or $NH_2R^6[NR^7R^6]_y$ wherein R^6 is an alkylene group of 1 to about 10 carbon atoms, R^7 is independently H, alkyl or R^6 and y is 1 to about 6, R^5 is hydrogen or hydrocarbyl or (I); and u is 2 to about 6; with

(B) at least one hydrocarbyl carboxylic acid or derivative thereof.

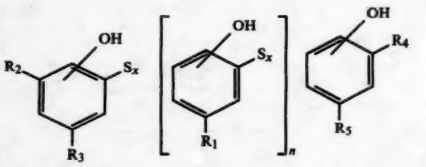
4,976,882

ALKYL PHENOL-SULFUR CONDENSATES AS FUEL AND LUBRICATING OIL ADDITIVES

David J. Martella, Princeton, and John J. Jaruzelski, Westfield, both of N.J., assignors to Exxon Chemical Patents, Inc., Linden, N.J.

Filed Oct. 8, 1987, Ser. No. 107,457
Int. Cl.[5] C10M *105/12, 105/72*
U.S. Cl. 252—48.2 **43 Claims**

1. Polymeric additive capable of improving the low temperature flow properties of hydrocarbon oil comprising polymer which can be represented by the formula:



(I)

wherein (a) x comprises a number from 1 to about 8; (b) R_1 represents alkyl derived from linear alpha-olefins having from 6 to 50 carbon atoms; (c) R_2, R_3, R_4 and R_5 represent hydrogen or alkyl derived from linear alphaolefins having from 6 to 50 carbon atoms, provided that at least one of R_2 and R_3 and at least one of R_4 and R_5 are alkyl; (d) in the alkyl groups constituting R_1 to R_5; (i) the average number of carbon atoms is between about 12 and 26; (ii) not more than about 10 mole percent of said alkyl groups have less than 12 carbon atoms and not more than about 10 mole percent of said alkyl groups have more than 26 carbon atoms; and (iii) said alkyl group are essentially linear; (e) n is a number of at least about 5; and (f) said polymer has a number average molecular weight of at least about 3,000 and a molecular weight distribution of at least about 1.5.

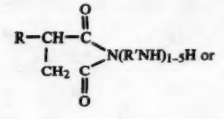
4,976,883

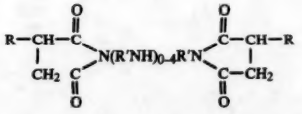
PROCESS FOR PREPARING A MAGNETIC FLUID

Takao Kanno, Tokyo; Yutaka Koda, Yokohama, and Hirokazu Nagato, Fujisawa, all of Japan, assignors to Nok Corporation, Tokyo, Japan

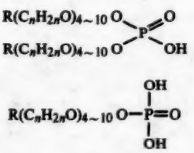
Filed Mar. 7, 1989, Ser. No. 319,695
Claims priority, application Japan, Mar. 11, 1988, 63-56151
The portion of the term of this patent subsequent to Dec. 11, 2007, has been disclaimed.
Int. Cl.[5] H01F *1/28*
U.S. Cl. 252—62.52 **15 Claims**

1. A process for preparing a magnetic fluid containing fine particles of ferrite which comprises coating said particles with a water-soluble surfactant and thereafter dispersing said coated particles in a carrier liquid having a vapor pressure of not more than 0.1 mmHg at 25° C., said carrier liquid containing a dispersing agent selected from (a) a N-polyalkylenepolyamine-substituted alkenylsuccinimide, represented by the formulae





wherein R is a hydrocarbon group having 12 to 24 carbon atoms or a polybutenyl group having a molecular weight of about 300 to about 2,000 and R′ is an alkylene group having 1 to 6 carbon atoms and can be the same or different when at least two of R′ are repeated, and (b) a phosphoric acid ester having a di- or mono-oxyalkylene group, represented by the formulae



where R is an alkyl group having 6 to 18 carbon atoms or an alkylphenyl group having an alkyl group having 5 to 10 carbon atoms and n is 2 or 3.

4,976,884

HEAT RESISTANT COMPOSITION PROCESSABLE BY WET SPINNING

Pierre Delvaux, Bromptonville, and Normand Lesmerises, Rock Forest, both of Canada, assignors to Ceram-Sna Inc., Sherbrooke, Canada

Filed Sep. 19, 1989, Ser. No. 409,066
Int. Cl.[5] E04B *1/76*
U.S. Cl. 252—62 **7 Claims**

1. A heat-resistant composition for use in producing articles capable of resisting high temperatures for substantial periods of time, said composition comprising:

(a) from 70 to 95% by weight of a fibrous-like, synthetic forsterite obtained by calcination of chrysotile asbestos fibers at a temperature of from 650° C. to 1450° C., said synthetic forsterite having an MgO: SiO2 ratio lower than 1.1, a raw loose density of from 3 to 40 pcf, a thermal conductivity "k" factor of from 0.25 to 0.40 BTU. in/hr.° F.ft[2] and a fusion point of from 1600° C. to 1700° C.; and the binder consisting predominantly of

(b) a binder selected from the group consisting of organic binders, mineral binders of the silicate type and mixtures thereof.

4,976,885
LIQUID PREPARATIONS FOR CLEANING HARD SURFACES

Klaus-Dieter Wisotzki; Klaus Schumann, both of Erkrath; Konard Engelskirchen, Meerbusch, and Brigitte Hase, Erkrath, all of Fed. Rep. of Germany, assignors to Henkel Kommanditgesellschaft auf Aktien, Duesseldorf-Holthausen, Fed. Rep. of Germany

Filed Aug. 12, 1988, Ser. No. 231,799
Claims priority, application Fed. Rep. of Germany, Aug. 13, 1987, 3726912
Int. Cl.[5] C03L 1/00
U.S. Cl. 252—174.17 12 Claims

1. A liquid composition for the cleaning of hard surfaces, said composition comprising an anionic surfactant either individually or in combination with a nonionic surfactant or amphoteric surfactant, and an ampholytic cellulose ether polymer, said ampholytic cellulose ether polymer comprising a diethylaminoethyl-carboxymethylcellulose having a degree of substitution of between about 0.4 and about 2.

4,976,886
PREPARATION OF ORGANOMETALLIC AND ORGANOBIMETALLIC COMPOUNDS

Robert C. Morrison, and Terry L. Rathman, both of Gastonia, N.C., assignors to Lithium Corporation of America, Gastonia, N.C.

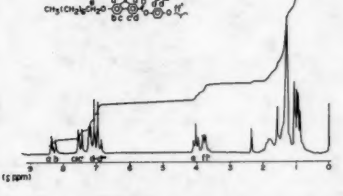
Continuation-in-part of Ser. No. 31,639, Mar. 30, 1987, abandoned. This application Feb. 25, 1988, Ser. No. 160,388
Int. Cl.[5] C09K 3/00
U.S. Cl. 252—182.3 10 Claims

1. An organometallic composition comprising (1) 50 to 99 mole percent of an organometallic composition (a) of the formula RM in which R is selected from methyl, ethyl and propyl and M the metal is an alkali metal selected from lithium, sodium and potassium; (2) 50 to 1 mole percent of an organometallic composition (b) of the formula $R^1R^2M^1$ in which R^1 and R^2 are independently selected from methyl, ethyl and propyl and M^1 the metal is selected from magnesium, barium, and calcium; (3) a hydrocarbon solvent; (4) 0.05 to 2 mole equivalents of a Lewis Base selected from tetrahydrofuran and methyltetrahydrofuran per mole of organometallic composition; and (5) 1 to 100 mole percent of lithium halide, LiX, based on the organometallic composition.

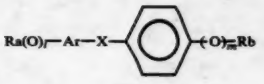
4,976,887
OPTICALLY ACTIVE LIQUID CRYSTAL COMPOUND AND METHOD OF MANUFACTURING THE SAME, LIQUID CRYSTAL COMPOSITION CONTAINING THE SAME AND LIQUID CRYSTAL DISPLAY DEVICE

Kohki Takatoh, Ayase; Masanori Sakamoto, Kawasaki, and Kazuyuki Sunohara, Tokyo, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

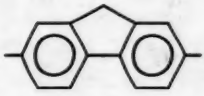
Filed Nov. 23, 1988, Ser. No. 275,383
Claims priority, application Japan, Jan. 21, 1988, 63-9616
Int. Cl.[5] C09K 19/32; C07C 69/76
U.S. Cl. 252—299.62 13 Claims



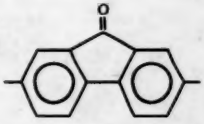
1. A compound of the formula:



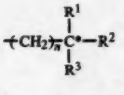
wherein Ar represents



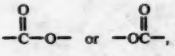
or



each of Ra and Rb independently representing an optically non-active alkyl group which i a straight-chain alkyl group having 3 to 18 carbon atoms or an optically active group having the formula:



wherein each of R^1, R^2 and R^3 independently represents a C_1–C_{18} alkyl group or hydrogen atom; R^1, R^2 and R^3 satisfying conditions $R^1 \neq R^2$, $R^2 \neq R^3$ and $R^3 \neq R^1$ at the same time, wherein at least one of said R^1, R^2 and R^3 is methyl, and wherein at least one of Ra and Rb is said optically active group, X represents



n represents an integer of from 0 to 15 and each of l and m represent 0 or 1.

4,976,888
ANTIFOAM BASED ON OIL-IN-WATER EMULSION

Arnold De Clercq, Dirmstein; Wolfram Bergold, Heidelberg; Hans-Juergen Degen, Lorsch, and Jaroslav Melzer, Ludwigshafen, all of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

Filed Dec. 30, 1988, Ser. No. 292,332
Claims priority, application Fed. Rep. of Germany, Dec. 31, 1987, 3744593
Int. Cl.[5] B01D 19/04
U.S. Cl. 252—358 10 Claims

1. An antifoam oil-in-water emulsion, which consists essentially of water and an oil phase wherein said oil phase consists of from 95 to 50% by weight of

(a) a C_{12}–C_{26}-alcohol, a distillation residue which is obtainable in the preparation of alcohols having a relatively large number of carbon atoms by the oxo process or by the Ziegler process and which may furthermore be oxyalkylated,

(b) a fatty acid ester of a C_{12}–C_{22}-carboxylic acid with a monohydric to trihydric C_1–C_{18}-alcohol, or a mixture thereof, and

from 5 to 50% by weight of

(d) one or more components which melt at above 70° C. and are selected from the group consisting of the fatty alcohols

of not less than 28 carbon atoms, the esters of C_1–C_{22}-carboxylic acid with an alcohol of not less than 28 carbon atoms, the adducts of C_2–C_4-alkylene oxide with alcohols of not less than 28 carbon atoms,

wherein said oil phase has a mean particle size of <25 μm.

4,976,889

4-FORMYLAMINOPIPERIDINE DERIVATIVES, THEIR USE AS STABILIZERS AND ORGANIC MATERIAL STABILIZED WITH THE SAID DERIVATIVES

Alexander Asmueller, Deidesheim; Peter Neumann, Wiesloch, and Hubert Trauth, Dudenhofen, all of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

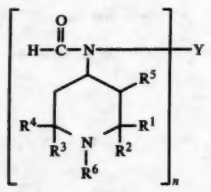
Filed Nov. 14, 1988, Ser. No. 270,806

Claims priority, application Fed. Rep. of Germany, Nov. 14, 1987, 3738736

Int. Cl.[5] **C09K** *15/22, 15/26;* **C07D** *211/40, 211/56*

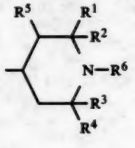
U.S. Cl. 252—403 **15 Claims**

1. A 4-formylaminopiperidine of the formula (I)

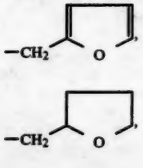


(II)

where n is 1 or 2, R^1, R^2, R^3 and R^4 independently of one another are each C_1–C_4-alkyl, or R^1 and R^2 or R^3 and R^4 together form a tetramethylene or pentamethylene group, R^5 is hydrogen or C_1–C_4-alkyl, R^6 is hydrogen, C_1–C_{22}-alkyl or C_3–C_{22}-alkenyl or is C_7–C_{12}-phenylalkyl which is unsubstituted or substituted by C_1–C_4-alkyl, C_1–C_4-alkoxy, fluorine, chlorine, methylenedioxy, ethylenedioxy or di-C_1–C_4-alkylamino or is C_1–C_{22}-alkanoyl, C_2- or C_3-cyanoalkyl, C_1–C_{22}-hydroxyalkyl or C_2–C_{22}-aminoalkyl and, when n is 1, y is hydrogen, C_1–C_{22}-alkyl, C_3–C_{22}-alkenyl, C_3–C_{12}-cycloalkyl or bicycloalkyl or is C_2–C_{22}-alkyl which is substituted by cyano, hydroxyl or carbo-C_1–C_4-alkoxy, or is C_4–C_{22}-alkyl which is interrupted by ether oxygen, nitrogen or sulfur, or is C_7–C_{22}-phenyl- or diphenylalkyl, C_7–C_{22}-phenylalkyl which is substituted by C_1–C_4-alkyl, C_1–C_4-alkoxy, fluorine, chlorine, methylenedioxy, ethylenedioxy or di-C_1–C_4-alkylamino, or is phenyl which is unsubstituted or substituted by C_1–C_4-alkyl or carbo-C_1–C_4-alkoxy, or is a radical of the formula



or



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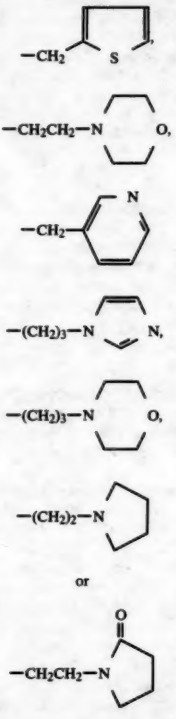


or, when n is 2, Y is C_2–C_{22}-alkylene, C_5–C_{22}-cycloalkylene, C_8–C_{14}-phenylalkylene or phenylene, or is C_4–C_{30}-alkylene which is interrupted by ether oxygen, nitrogen, sulfur or the acid addition salts of this compound.

15. A stabilized organic material containing one or more piperidine derivatives as claimed in claim **1**.

4,976,890

STATIC DISSIPATIVE VINYL SHEET AND FILM

Richard E. Felter, Lancaster; Dean A. Markley, Mountville, and Deborah L. Musser, Lancaster, all of Pa., assignors to Armstrong World Industries, Inc., Lancaster, Pa.

Filed Jun. 3, 1988, Ser. No. 201,854

Int. Cl.[5] **H01B** *1/06*

U.S. Cl. 252—511 **12 Claims**

1. A vinyl composition having reduced electrical surface resistivity, comprising a fused layer of a dry blend of:

(a) a polyvinyl chloride porous dry blend resin, the said porous dry blend resin containing particles of resin with a conductive shell,

(b) a plasticizer for the polyvinyl chloride dry blend resin,

(c) a stabilizer for the polyvinyl chloride dry blend resin,

(d) conductive particles in an amount of from 0.2 to 20% by weight of the total weight of the composition, wherein the conductive particles form the conductive shell.

4,976,891

BICYCLIC SULFONAMIDE DERIVATIVES

Masayuki Narisada, Osaka; Mitsuaki Ohtani; Fumihiko Watanabe; Sanji Hagishita, all of Nara; Kaoru Seno, and Susumu Kamata, both of Hyogo, all of Japan, assignors to Shionogi & Co., Ltd., Osaka, Japan

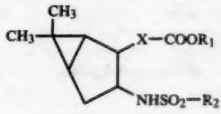
Division of Ser. No. 927,823, Nov. 5, 1986, Pat. No. 4,861,913. This application Mar. 23, 1989, Ser. No. 327,778

Claims priority, application Japan, Nov. 18, 1985, 60-259154; Feb. 13, 1986, 61-30130; May 19, 1986, 61-115599; Jun. 3, 1986, 61-129011; Jul. 17, 1986, 61-169257

Int. Cl.[5] C07C *311/10, 311/13, 311/20*

U.S. Cl. 260—401 6 Claims

1. A compound represented by the formula:



wherein R_1 is a hydrogen or C_1–C_5 alkyl; R_2 is a C_1–C_{10} alkyl, aryl, aralkyl, or pyridyl, where the aryl, aralkyl, or pyridyl are unsubstituted or are substituted by C_1–C_5 alkyl, C_1–C_5 alkoxy, nitro, hydroxy, carboxy, amino, C_1–C_5 alkylamino, C_1–C_5 dialkylamino whose two alkyl groups may be different from each other, C_2–C_4 alkanoylamino, or halogen and X is a C_1–C_7 alkylene, C_2–C_7 alkenylene, 1-fluoro-2-hexenylene, trimethylenethioethylene, ethylenethiotrimethylene, phenyleneoxymethylene, or 2-propenylene-m-phenylene, or its pharmaceutically acceptable salt.

4,976,892

PROCESS FOR THE CONTINUOUS TRANSESTERIFICATION OF FATTY ACID LOWER ALKYL ESTERS

Lutz Jeromin; Eberhard Peukert; Bernhard Gutsche; Gerhard Wollmann, all of Hilden, and Bernard Schleper, Duesseldorf, all of Fed. Rep. of Germany, assignors to Henkel Kommanditgesellschaft auf Aktien, Duesseldorf, Fed. Rep. of Germany

Filed Mar. 14, 1989, Ser. No. 323,517

Claims priority, application Fed. Rep. of Germany, Mar. 14, 1988, 3808427

Int. Cl.[5] C11C *3/02*

U.S. Cl. 260—410.7 19 Claims

1. A process for the continuous transesterification of a C_6–C_{22} fatty acid lower alkyl ester with a polyhydric C_2–C_5 alcohol in the presence of a homogeneous alkaline catalysts, which comprises:

(a) introducing at least one preheated polyhydric C_2–C_5 alcohol and an alkaline transesterification catalyst, in solution in a solvent, into the upper part of a multiple-plate reaction column, the reaction column operated at a boiling equilibrium in a lower section and predominantly in an adsorption/desorption equilibrium in an upper section, the upper section of the reaction column is in communication with a rectifying zone;

(b) introducing at least one fatty acid lower alkyl ester heated to at least its boiling temperature, at the pressure in the reaction column, into the middle part of the reaction column and transesterifying the fatty acid lower alkyl ester with the polyhydric alcohol to form lower alkanol, and polyhydric alcohol fatty acid ester;

(c) introducing the lower alkanol into the rectifying zone to provide a rectified lower alkanol;

(d) removing a stream from the lower section of the reaction column at the temperature of said section;

(e) removing a portion of the stream comprising fatty acid lower alkyl ester, polyhydric alcohol, polyhydric alcohol fatty acid ester as product, heating the stream after removal of the product to a temperature above the temperature of the lower section of the reaction column and returning the heated stream to the lower section of the reaction column.

4,976,893

PROCESS FOR PREPARING CARBOXYLIC ACIDS

Ernst I. Leupold, Neu-Anspach, Fed. Rep. of Germany, assignor to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Jun. 18, 1986, Ser. No. 875,638

Claims priority, application Fed. Rep. of Germany, Jun. 20, 1985, 3522032

Int. Cl.[5] C07C *51/235, 53/126, 53/136, 59/70*

U.S. Cl. 260—413 4 Claims

1. A process for preparing carboxylic acids by platinum-catalyzed oxidation of primary alcohols of limited water solubility with oxygen in a mixture of water and a solubilizer which comprises using as the solubilizer ethers of the formula $R_1O(CH_2CH_2O)_nR_2$, where n is 1–4 and R_1 and R_2 are alkyl radicals having 1–4 carbon atoms.

4,976,894

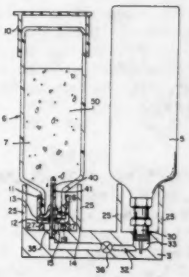
CARBON DIOXIDE INJECTION INTERFACE IN CARBONATION APPARATUS

Bruce R. Robinson, Stevensville, Md., assignor to NSA Acquisition, Inc., Memphis, Tenn.

Filed Sep. 22, 1989, Ser. No. 411,567

Int. Cl.[5] B01F *3/04*

U.S. Cl. 261—64.1 17 Claims



1. In a carbonation apparatus of the type comprising means for injecting CO_2 into liquid in an interior of an inverted serving vessel, said means including a nozzle for penetration through a normally closed hole in a septum to project into liquid to be carbonated, said septum being retained between a cab and the vessel, said cap being rotatable to close the vessel, said nozzle being constructed to communicate with a source of CO_2, the improvement wherein said nozzle is formed of from about five parts to about nine parts structural resin to one part PTFE by weight.

4,976,895

LIGHTWEIGHT COOLING TOWER WITH FAN SUPPORTED BY A VERTICAL LIQUID SUPPLY PIPE

Charles J. Bardo, Ft. Worth, Tex., assignor to Ceramic Cooling Tower Company, Fort Worth, Tex.

Filed Dec. 15, 1989, Ser. No. 451,521

Int. Cl.[5] B01F *3/04*

U.S. Cl. 261—108 12 Claims

1. In a water cooling tower having:

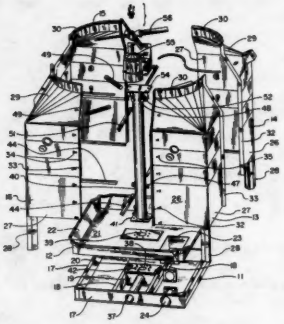
a basin formed from fiberglass reinforced resin having a bottom wall and an upwardly extending side wall,

a plurality of side panels supported by the basin and extending upwardly therefrom, the side panels being formed

from fiberglass reinforced resin and forming a cooling enclosure with an opening in the top,

porous means for heat/mass exchange means supported within the cooling enclosure, the improvement comprising:

a horizontally extending base below the basin and supporting the basin, the base including a plurality of beams supporting the bottom wall of the basin below the side walls thereof and a central beam below the central portion of the bottom wall,



a liquid supply pipe supported by the central beam and extending vertically upwardly within the center of the cooling enclosure,

liquid distribution means above the heat/mass exchange means and connected to the liquid supply pipe for supplying liquid to the heat/mass exchange means, and

a fan above the liquid distribution means and supported by the liquid supply pipe for drawing air through the heat/mass exchange means.

4,976,896

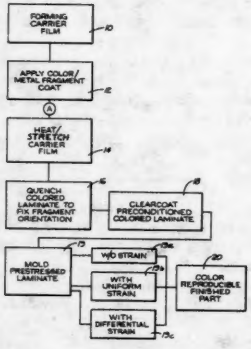
PROCESS OF MAKING THERMOFORMABLE LAMINATE FILMS AND PROCESSES

William T. Short, Southfield, and Rebecca S. Hoerner, Grosse Point Woods, both of Mich., assignors to General Motors Corporation, Detroit, Mich.

Filed Aug. 17, 1988, Ser. No. 233,311

Int. Cl.[5] B29D *11/00*; B05D *3/12*; B32B *27/06*

U.S. Cl. 264—1.9 **4 Claims**



1. A process for producing laminated decorative films having platy fragments therein for establishing a thermoformable film that can be molded without strain, with uniform strain or with strain differential in the film while maintaining a reproducible color appearance in the surface finish of a part covered by the film consisting of the steps:

providing a thermoplastic polymeric carrier film;

depositing a colored base coat and optionally a clearcoat of 1–5 mils in thickness on the carrier film, said base coat having platy fragments therein with an initial angle of repose with respect to the surface of the deposited coat which will respond to subsequent strain molding of the carrier film to adjust to a second strain related angle of repose; and

preconditioning the carrier film following application of the colored base coat with or without clearcoat by stretching said film following softening to increase the usable area thereof by greater than 5% and by quenching after said stretching to fix said platy fragments at an angle of repose which is less responsive to mold induced strain so as to stabilize the finish appearance of a product when the laminate is molded thereagainst to cover an unfinished surface thereof.

4,976,897

COMPOSITE POROUS MEMBRANES AND METHODS OF MAKING THE SAME

Robert W. Callahan, Charlotte, and Richard D. Johnson, Monroe, both of N.C., assignors to Hoechst Celanese Corporation, Somerville, N.J.

Filed Dec. 16, 1987, Ser. No. 133,824

Int. Cl.[5] B01D *67/00*

U.S. Cl. 264—22 **12 Claims**

8. A method of making a composite porous membrane having a porous support and a cured resin layer on at least one surface of said porous support comprising coating at least one surface of a porous polymeric support having pores of a size between about 0.005 and about 0.2 microns with a UV-curable resin having a viscosity of at least 35,000 centipoise which essentially does not wet the porous support for a sufficiently long time period after said UV-curable resin is coated upon said at least one surface of said porous support to allow curing of said UV-curable resin, and then during said time period in which said UV-curable resin essentially does not wet said porous support, subjecting the resin coated porous support to ultraviolet light sufficient to cure the resin coating on said at least one surface of said porous support.

4,976,898

PROCESS FOR MAKING PUNCTURE RESISTANT, HEAT-SHRINKABLE FILMS CONTAINING VERY LOW DENSITY POLYETHYLENE

Stanley Lustig, Park Forest; Nancy M. Mack, Chicago; Jeffrey M. Schuetz, Woodridge, and Stephen J. Vicik, Darien, all of Ill., assignors to Viskase Corporation, Chicago, Ill.

Division of Ser. No. 42,087, Apr. 24, 1987, Pat. No. 4,863,769, which is a continuation of Ser. No. 745,236, Jun. 17, 1985, abandoned. This application Jul. 25, 1989, Ser. No. 384,589

Int. Cl.[5] B29C *71/04*

U.S. Cl. 264—22 **24 Claims**

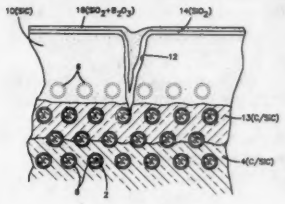
1. A method of manufacturing a heat-shrinkable, puncture resistant, biaxially stretched, thermoplastic film comprising the steps of extruding a primary tube comprising a very low density polyethylene which is a linear copolymer of ethylene and higher alpha olefin containing from 3 to 8 carbon atoms, having a density below about 0.91 g/cm^3 and a 1% secant modulus below about 140,000 kPa; heating the very low density polyethylene primary tube; biaxially stretching the heated primary tube using a double bubble method under conditions wherein the biaxially stretched tube is heat shrinkable from about 30% to about 50% at a temperature of about 90° C. in at least one of the transverse and machine directions.

4,976,899

PROCESS FOR THE PRODUCTION OF A COMPOSITE MATERIAL WITH MATRIX AND REINFORCING FIBERS OF CARBON

Gérard Rousseau, 22 Hameau de Villepreux, 33160 Saint Aubin De Medoc, and Nicole Pastureau, 3 rue du Canter, 33320 Eysines, both of France

Division of Ser. No. 159,175, Feb. 23, 1988, Pat. No. 4,863,773. This application May 11, 1989, Ser. No. 350,608
Claims priority, application France, Feb. 25, 1987, 87 02496
Int. Cl.[5] C22C *16/32*; C01B *31/00*
U.S. Cl. 264—29 18 Claims



1. A process for the production of a composite material having a substrate (2) of carbon fibers embedded in a matrix (4), characterized in that it comprises the following stages:

(a) forming a deformable, porous substrate constituted with carbon fibers (2) and comprising pores,

(b) covering the surface of each fiber (2) of the substrate with a fine silicon carbide coating (6) by chemical vapor deposition, so that the substrate retains its deformability,

(c) shaping the substrate,

(d) densifying the shaped substrate to form the matrix with a carbon material containing finely divided, amorphous silicon carbide and representing at the most 20% by weight of the matrix (4),

(e) covering the outer surface of the matrix with an outer silicon carbide covering (10) comprising cracks (12),

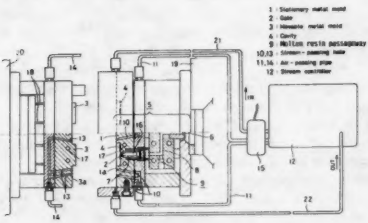
(f) filling the cracks of the outer covering with at least a borosilicate glass (16).

4,976,900

METHOD AND APPARATUS FOR GUSHING AIR STREAM INTO METAL MOLDS IN INJECTION MOLDING MACHINE

Shigeru Tsutsumi, Tokyo, Japan, assignor to Sanri Kabushiki Kaisha, Tokyo, Japan

Filed Sep. 15, 1988, Ser. No. 244,960
Claims priority, application Japan, Sep. 18, 1987, 62-232402
Int. Cl.[5] B29C *45/72*
U.S. Cl. 264—39 15 Claims



1. A method of injection molding, comprising the steps of:

injecting a hot molten substance through a gate into a cavity defined by opposing surfaces of a metal mold, said metal mold being repeatedly opened and closed; and

solidifying said hot molten substance by cooling, thereby yielding a molded article;

wherein said method comprises the further step of gushing a stream of gas towards both said substance and both of said opposed surfaces of said metal mold each time each metal mold is opened, adequate to simultaneously aid cooling of said substance and remove dew and oily matter from said at least one mold surface by impingement of said gas;

said stream of gas is also gushed towards said gate, adequate to cool and solidify a portion of said substance facing said gate, thereby clogging said gate.

4,976,901

MICROPOROUS MEMBRANES FROM ISOTACTIC POLYSTYRENE AND SYNDIOTACTIC POLYSTYRENE

Henry N. Beck, Walnut Creek, and Robert D. Mahoney, Danville, both of Calif., assignors to The Dow Chemical Company, Midland, Mich.

Division of Ser. No. 380,845, Jul. 14, 1989, Pat. No. 4,927,535. This application Feb. 8, 1990, Ser. No. 477,363
Int. Cl.[5] B01D *67/00*
U.S. Cl. 264—45.9 12 Claims

1. A process comprising: preparing a semi-permeable isotropic or anisotropic microporous membrane having properties sufficient for maintaining structural integrity under conditions of ultrafiltration and/or microfiltration, by:

A. forming a mixture comprising:

(i) isotactic polystyrene and syndiotactic polystyrene, wherein the ratio of isotactic polystyrene to syndiotactic polystyrene is such that the membrane possesses sufficient structural integrity under conditions of operation, and

(ii) at least one solvent for the polystyrenes;

B. heating the mixture to a temperature under conditions such that a homogeneous fluid is formed which possesses sufficient viscosity to be formed into a membrane;

C. extruding or casting the homogeneous fluid into a membrane;

D. quenching or coagulating the membrane by passing the membrane through one or more zones under conditions such that the membrane solidifies; and

E. simultaneously or consecutively leaching the membrane by passing the membrane through one or more zones under conditions such that at least a substantial portion of the solvent for the polystyrenes is removed from the membrane;

wherein the semi-permeable membrane so formed possesses isotropic or anisotropic microporous structure.

4,976,902

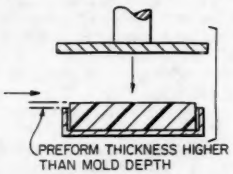
MOLDING METHOD FOR PRODUCING EXPANDED POLYOLEFIN FOAM

William L. Oberle, Goode, Va., assignor to Rubatex Corporation, Bedford, Va.

Filed Oct. 4, 1988, Ser. No. 253,250
Int. Cl.[5] B29C *67/22*
U.S. Cl. 264—54 9 Claims

1. A method of making a low density polyolefin resin foam utilizing a mold having a molding cavity of fixed volume determined by a fixed cross-sectional area and a defined substantially uniform thickness which is open at its top throughout said area and is adapted to be closed by means of an openable platen overlapping around its margins with the ends of the side walls of said cavity, which method comprises the steps of forming into a solid resilient pre-form a molding composition consisting essentially of a polyolefin resin selected from the group consisting of polyethylene, co-polyethylene/vinyl acetate, and mixtures thereof, and homogeneously distributed through said resin finely divided particles of a solid blowing agent in the amount of 10–15 parts per 100 parts resin in a

peroxy-cross-linking agent for said resin in an amount at least substantially sufficient to cross-link the same, said blowing agent undergoing decomposition and releasing a gas when heated above its decomposition temperature and said cross-linking agent undergoing a cross-linking reaction with said polyolefin resin when heated above an initiating temperature, each said temperature being within the range of about 225° F.–400° F. and higher than the softening temperature of said resin, said pre-form having a cross-sectional area fitting within the mold cavity area, a thickness in excess of said defined mold thickness, and a solid volume exceeding the fixed mold cavity volume by 0.1–1.0 percent; placing said solid pre-form in said mold cavity while said platen is open and then closing said platen to close said cavity and thereby compress the solid pre-form to the thickness of said cavity, the excess volume of said pre-form extruding laterally between the ends of the cavity side walls and platen margins around said cavity as a flashing; after closure of the mold applying an external pressure to said platen in the range of about 8,500–12,000 pounds per square inch of the mold cross-sectional area while heating said pre-form to a temperature higher than said decomposition and initiation temperatures for a time sufficient to soften said resin and essentially decompose said blowing agent and generate incipient gas bubbles in said softened resin and at least initiate said cross-linking reaction while said pre-form remains in said closed mold; without releasing said pressure cooling the closed mold to below the softening temperature of said resin; opening the closed mold and removing the cooled molded product therefrom; and finally heating the removed product to a temperature to expand the incipient gas bubbles therein and complete the cross-linking reaction thereof, to give a foamed product with fine substantially uniform closed cells distributed homogeneously therethrough.

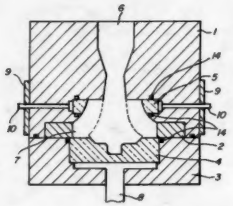


4,976,903

SHAPING MOLDS AND SHAPING OF CERAMIC BODIES BY USING SUCH SHAPING MOLDS

Tadaaki Matsuhisa, Kasugai, and Hiroyuki Iwasaki, Nagoya, both of Japan, assignors to NGK Insulators, Ltd., Japan

Filed Jul. 11, 1988, Ser. No. 217,407
Claims priority, application Japan, Jul. 20, 1987, 62-180584
Int. Cl.[5] C04B *33/28*
U.S. Cl. 264—86 **2 Claims**



1. A process for shaping ceramic bodies, comprising the steps of:

preparing a ceramic composition comprising ceramic powder, a sintering aid, a shaping assistant consisting of a gelatinizable water-soluble binder, and water;

pouring the ceramic composition into a shaping mold, said shaping mold comprising a non-permeable mold or a combination of a non-permeable mold and a permeable mold, and at least a portion of a shaping surface of said non-permeable mold consisting of a material having a contact angle with water of not less than 80°;

pressing the ceramic composition to form a shaped ceramic body;

heating said shaping mold to a temperature higher than a gelatinization temperature of said gelatinizable water-soluble binder to gelatinize said binder and strengthen said shaped ceramic body; and

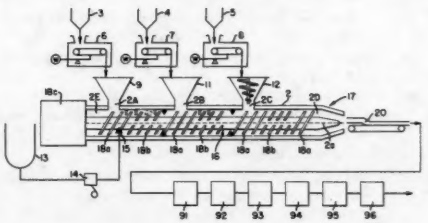
releasing the shaped ceramic body from said shaping mold.

4,976,904

METHOD AND APPARATUS FOR CONTINUOUS FORMATION OF FIBRILLATED POLYMER BINDER ELECTRODE COMPONENT

John M. Bilhorn, Stonington, Conn., assignor to Energy Research Corporation, Danbury, Conn.

Filed Apr. 20, 1989, Ser. No. 341,564
Int. Cl.[5] B29C *47/44*
U.S. Cl. 264—104 **34 Claims**



1. Apparatus for use in forming an electrode comprising:

a barrel for receiving electrode materials comprising an active material and a polymer binder;

means within said barrel for moving said received electrode materials axially while mixing and kneading said electrode materials such that said polymer binder is fibrillated; and

means disposed at the end of said barrel and adapted to receive the mixture of electrode materials including said fibrillated polymer binder as said mixture is moved axially in said barrel and to continuously form from said mixture a cohesive electrode component without bringing said polymer binder to the melt stage comprising: a hob member having an outer surface; and a surrounding die having an inner surface; said outer and inner surfaces of said die and hob defining an adapter zone through which said mixture first passes and a smoothing zone following said adapter zone; the ratio of the length of said adapter zone in the axial direction to the barrel diameter being in the range of 0.5 to 0.75 and the ratio of the length of said smoothing zone to the thickness of said cohesive electrode component being less than about 3.5.

22. A method for use in forming an electrode comprising:

providing a barrel for receiving electrode materials comprising an active material and a polymer binder;

moving said received electrode materials axially within said barrel while mixing and kneading said electrode materials such that said polymer binder is fibrillated; and

receiving the mixture of electrode materials including said fibrillated polymer binder from the end of said barrel as said mixture is move axially in said barrel and continuously forming from said mixture a cohesive electrode component without bringing said polymer binder to the melt stage; said forming being carried out with a hob member having an outer surface and a surrounding die

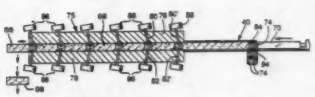
having an inner surface; said outer and inner surfaces of said die and hob defining an adapter zone through which said mixture first passes and a smoothing zone following said adaptor zone; the ratio of the length of said adapter zone in the axial direction to the barrel diameter being in the range of 0.5 to 0.75 and the ratio of the length of said smoothing zone to the thickness of said cohesive electrode component being less than about 3.5.

4,976,905

METHOD AND APPARATUS FOR MAKING WOOD PRODUCT

Gordon E. Brown, 196 W. 25th Ave., Eugene, Oreg. 97405

Filed Nov. 1, 1989, Ser. No. 430,572
Int. Cl.[5] B27N *3/22, 3/12*
U.S. Cl. 264—115 **11 Claims**



1. The process of preparing a composite lumber-like product comprising consolidated comminuted wood and thermosetting resin, which process comprises:

comminuting a woody raw material so as to produce particles having a length axis paralleling the grain of the wood, a width axis and a thickness axis, all in substantially decreasing ratio of dimension L:W:T;

coating the particles with a thermosetting resin;

felting the particles into a mat having a length equal to the length dimension of said lumber-like product, the felted mat depth corresponding approximately to the thickness dimension of said product, and a width such that upon compaction to the width dimension of said product the product will have a predetermined density; and

compacting such mat in a heated mold having fixed longitudinal end and top and bottom walls to applying an opposed constraining means or compressing thrust in a direction parallel to said width dimension of the product;

completing said compacting to said width dimension within a time period of twenty seconds or less,

and effecting cure of the thermosetting resin in said mold and thereafter ejecting the formed lumber-like board.

5. Apparatus for forming a lumber-like product from comminuted wood particles coated with a thermosetting resin comprising,

a first horizontal conveyor, having an upper run driven in a first direction,

parallel, elongate means for depositing windrows of said coated particle upon said first conveyor with the long axis of each of said windrows perpendicular to said first direction,

means defining an open-sided antechamber positioned at the discharge end of said first conveyor,

means for sweeping windrows of particles from the discharge end of said first conveyor into said antechamber through one side thereof as the particles are conveyed thereto,

means defining a plurality of cold chambers each comprising an elongate box having top, bottom and end walls and being open at each side, said box having a length substantially equal to the length of said windrows,

means for positioning an empty cold chamber in justaposition with said antechamber whereby said particles may be moved through said antechamber and into said juxtaposed cold chamber,

a mold comprising a plurality of opposed upper and lower heated platens,

means for moving a particle filled cold chamber from its position adjacent said antechamber to a position in juxtaposition with said mold,

and ram means for compacting the load of particles in a cold chamber juxtaposed with said mold and simultaneously moving said load of particles into said mold,

and means for ejecting a load of particles from said mold after a predetermined period of time.

4,976,906

METHOD AND APPARATUS FOR SHAPING A CONTINUOUS ROD-LIKE MOLDING

Takayoshi Nakasone, Gifu; Kenji Kozuka, Ichinomiya, and Haruo Kimura, Kasamatsu, all of Japan, assignors to Ube-Nitto Kasei Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 597,941, Apr. 5, 1984, abandoned. This application Feb. 18, 1986, Ser. No. 829,860
Claims priority, application Japan, Jan. 24, 1984, 59-9415
Int. Cl.[5] B29C *47/90*
U.S. Cl. 264—139 **6 Claims**

1. A method of shaping a continuous rod-like molding to a predetermined dimension, said molding comprising a core formed of fiber reinforced thermosetting resin and an outer skin formed of thermoplastic resin and covering said core, and said molding being preformed by first solidifying said thermoplastic resin and then hardening said thermosetting resin, said method comprising the steps of:

providing a preheating die having a passage with a diameter slightly larger than an initial diameter of said molding;

introducing said molding into said passage;

maintaining said preheating die at a temperature higher than the melting pint of said thermoplastic resin forming said outer skin;

passing said molding through said passage at a predetermined speed to achieve plasticizing said thermoplastic resin of said outer skin only at an outer surface portion thereof without plasticizing said thermoplastic resin at a junction interface between said outer skin and said core;

providing a first shaping die including a passage having a diameter approximately equal to said initial diameter of said molding;

maintaining said first shaping die at a temperature lower than the temperature of said preheating die;

introducing said molding into and passing said molding through said passage of said first shaping die;

providing a second shaping die including a passage having a diameter slightly smaller than said initial diameter of said molding;

maintaining said second shaping die at a temperature substantially equal to the temperature of said preheating die;

introducing said molding into and passing said molding through said passage of said second shaping die, thereby removing a portion of said outer skin thereof previously plasticized by said preheating die, without affecting said junction interface; and

cooling said molding immediately after it is removed from said second shaping die to solidify said thermoplastic resin, thereby obtaining a product having a diameter equal to said diameter of said passage of said second shaping die.

3. An apparatus for shaping a continuous rod-like molding to a predetermined dimension, said molding comprising a core formed of fiber reinforced thermosetting resin and an outer skin formed of thermoplastic resin and covering said core and being preformed by means for first solidifying said thermoplastic resin and means for then hardening said thermosetting resin, said apparatus comprising:

a preheating die having formed therein a passage having a diameter slightly larger than an initial diameter of said molding;

heater means for maintaining said preheating die at a temperature higher than a melting point of said thermoplastic resin to permit an outer surface portion of said outer skin to be plasticized without plasticizing a junction interface between said outer skin and said core;

a first shaping die having formed therein a passage aligned with said passage of said preheating die, said passage of said first shaping die having a diameter approximately equal to said initial diameter of said molding, said first shaping die being maintained by heater means at a temperature lower than the temperature of said preheating die;

a second shaping die having formed therein a passage aligned with said passage of said first shaping die, said passage of said second shaping die having a diameter slightly smaller than said initial diameter of said molding, said second shaping die being maintained by heater means at a temperature substantially equal to the temperature of said preheating die, thereby enabling removal of a portion of said outer skin without affecting said junction interface of said molding;

a discharging hole formed at a junction between said first and second shaping dies to communicate said passages to the outside of said dies; and

a means for cooling and solidifying said thermoplastic resin and being disposed outside said second shaping die in the vicinity of an exit of said passage.

4,976,907

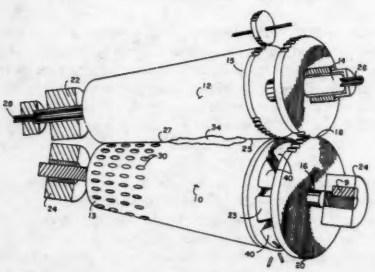
PELLETIZING ROLL AND METHOD

Gregory R. Brotz, P.O. Box 1322, Sheboygan, Wis. 53081

Filed Sep. 18, 1989, Ser. No. 408,927

Int. Cl.[5] B29B *9/00, 9/02*

U.S. Cl. 264—140 **6 Claims**



1. An improved roller for mixing, shearing and pelletizing materials comprising:

first conical-shaped roller having a wide end and a narrow end with heating means included therein;

a second conical shaped hollow roller having a wide end and a narrow end adjacent to said first roller with the narrow ends of each of said conical-shaped first and second rollers adjacent to one another and the wide ends of said conical shaped rollers adjacent to one another;

means to counter-rotate said first and second rollers;

a plurality of perforations defined in the narrow end of said second conical shaped hollow roller;

cutting means mounted within said second conical-shaped hollow roller adapted to cut off materials into pellets that pass through said perforations; and

means for said pellets to exit from said second conical-shaped hollow roller.

4. A method for mixing, shearing and pelletizing material comprising the steps of:

depositing material in the nip of the wider ends of a pair of counter-rotating conically shaped rollers with at least one of said rollers being hollow having their narrow ends adjacent to one another and their wider ends adjacent to one another;

rotating said rollers forcing said material to be mixed and sheared;

moving said material by the action of said conical-shaped rollers and gravity from the wide end of said rollers to the narrow end of said rollers;

providing a plurality of perforations in the narrow end of said hollow roller;

forcing said material when it reaches the narrow end of said rollers through said perforations in one of said rollers to the interior of said roller;

cutting said materials that pass through said perforations inside said roller into pellets; and

removing said pellets from said roller.

4,976,908

POLY(ARYLENE SULFIDE) SHEET PRODUCTION PROCESS

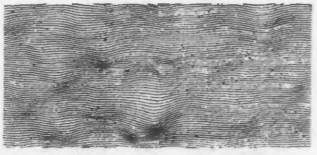
Toshiya Mizuno; Yoshikichi Teramoto; Takeshi Saito, all of Tsuchiura, and Juichi Wakabayashi, Tamari, all of Japan, assignors to Kureha Kagaku Kogyo K. K., Japan

Filed Dec. 28, 1988, Ser. No. 291,201

Claims priority, application Japan, Dec. 28, 1987, 62-329542

Int. Cl.[5] B29C *47/88*

U.S. Cl. 264—210.2 **2 Claims**



1. A process for the production of a polym-(arylene sulfide) sheet excellent in planarity and smoothness, which comprises:

melting a composition composed at least principally of a substantially linear, high molecular poly(arylene sulfide) having a melt viscisty of at least 1,000 poises,

extruding the melt through a slit die;

cooling and solidifying the extrudate into a sheet;

preheating the sheet for 3–100 seconds in a temperature range of from a temperature 20° C. lower than the glass transition temperature of the polymer to a temperature 25° C. higher than the glass transition temperature of the polymer; and

causing the thus-preheated sheet to pass between a heating roll heated at a temperature in a range of 120°–200° C. and a pinch roll under a pinch pressure of 0.05–10 kg/cm, whereby the sheet is continuously pressed under linear pressure, is subjected to a heat treatment for 3–100 seconds and is crystallized.

4,976,909

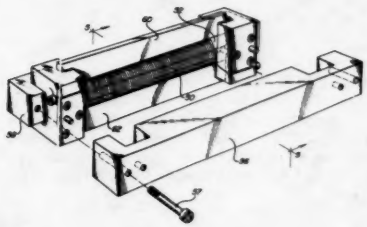
METHOD FOR MANUFACTURE OF SURGICAL FASTENING DEVICE

Glen C. Dorband, South Bound Brook; Alfred Liland, Wharton; Edgar Menezes, Somerville; Peter Steinheuser, Manville; Nicholas M. Popadiuk, Raritan, and Stephen J. Failla, Chester, all of N.J., assignors to Ethicon, Inc., Somerville, N.J.

Division of Ser. No. 733,351, May 13, 1985, Pat. No. 4,671,280. This application Feb. 9, 1987, Ser. No. 12,539

Int. Cl.[5] B29C *71/00*

U.S. Cl. 264—235 7 Claims



1. Process for producing a fastener member having a pair of legs extending from the same side of a connecting cross piece, said fastener member being adapted to be placed on one side of tissue to be joined with the legs penetrating the tissue, said fastener member being an oriented crystalline polymeric material, whereby the fastener member has sufficient inherent strength and stiffness so said legs can penetrate the tissue to be fastened, and said fastener member being adapted to mate with a receiver member to secure said fastener member in place, which process comprises forming an oriented polymeric filament into the configuration of said fastener member, annealing the thus formed filament at a temperature between the glass transition and melting temperatures of said polymer while restraining said filament from shrinking, and cooling the filament to a temperature below the glass transition temperature of said polymer while maintaining said filament under such restraint in the said configuration.

4,976,910

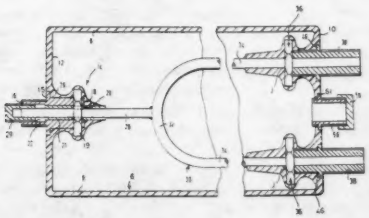
METHOD OF MAKING A COOLING DEVICE

Richard Gatley, Ayngstree Cottage, Clifton-on-Teme, Worcester; Ian F. Fox, Sinton Meadows, Stocks Lane, Leigh Sinton, Worcestershire, both of United Kingdom, and Greville T. Neale, Worcestershire, all of United Kingdom

Continuation-in-part of Ser. No. 126,574, Nov. 30, 1987, abandoned. This application Dec. 5, 1988, Ser. No. 279,542

Int. Cl.[5] B29C *39/10;* B29L *31/18*

U.S. Cl. 264—278 11 Claims



1. A method of manufacturing a cooling device comprising a housing for containing a eutectic liquid, an elongate cooling pipe in the housing through which cooling fluid is fed to cool the eutectic liquid, the elongate pipe comprising end portions and an intermediate portion between said end portions, involving the steps:

(a) locating the end portions of the pipe in a rotational mold;

(b) supporting the cooling pipe within the mold by the use of a supporting means supported in an aperture in a wall of the mold and extending therethrough to said intermediate portion;

(c) rotationally molding the housing of the cooling device around the cooling pipe and around the supporting means; and

(d) removing the supporting means on completion of the molding operation to provide an aperture in the housing.

4,976,911

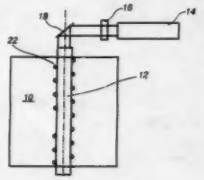
NUCLEAR REACTIVITY CONTROL USING LASER INDUCED POLARIZATION

Charles D. Bowman, Los Alamos, N. Mex., assignor to The United States of America as represented by the United States Department of Energy, Washington, D.C.

Filed May 26, 1989, Ser. No. 357,248

Int. Cl.[5] G21C *7/06*

U.S. Cl. 376—221 2 Claims



1. A method for controlling the reactivity of a reactor volume containing fissile material, including the steps of:

establishing a control volume within said reactor volume containing a quantity of ^3He effective to control said reactor from a sub-critical to a critical reactivity as said ^3He is spin-polarized with an alkali metal vapor effective for spin-exchange with said ^3He;

irradiating said control volume with a laser effective to spin-polarize said alkali metal vapor for spin polarizing said ^3He through said spin-exchange with said alkali metal to a spin-polarized density of said ^3He in said control volume to obtain said reactivity control; and

generating a guide magnetic field in said control volume oriented along the direction of said ^3He spin polarization effective to maintain said ^3He polarization and concomitant reactor reactivity.

4,976,912

APPARATUS FOR SEALING A CONTAINER FOR THE STORAGE OF RADIOACTIVE MATERIAL

Wolfgang Madle, Leimen; Norbert Gawlik, Neunkirchen, and Franz W. Popp, Wedemark, all of Fed. Rep. of Germany, assignors to Brennelementlager Gorleben GmbH, Fed. Rep. of Germany

Division of Ser. No. 99,912, Sep. 22, 1987, Pat. No. 4,847,009. This application Mar. 20, 1989, Ser. No. 325,855

Claims priority, application Fed. Rep. of Germany, Sep. 23, 1986, 3632270

Int. Cl.[5] G21C *17/00, 19/00;* G21F *9/12;* B23K *9/00*

U.S. Cl. 376—249 3 Claims

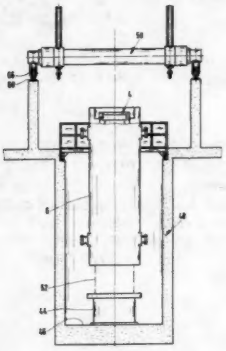
1. In an apparatus for sealing a cover to the inner container of a double container assembly for the transport and storage of radioactive material, said apparatus having a horizontal rotating platform for supporting said container assembly including welding and testing devices, the improvement comprising

a horizontally moveable bridge mounted on tracks disposed on opposite sides of and above said container assembly,

a pair of carriages mounted on said bridge for moving across the bridge,

welding and testing devices mounted on said carriages,

means for vertically adjusting said welding and testing devices into work or standby positions with respect to said container assembly,



said welding device having two gas shielded arc welders with tungsten electrodes positioned opposite each other on one of said carriages, and

means for controlling the movement of said carriages independently of each other.

4,976,913

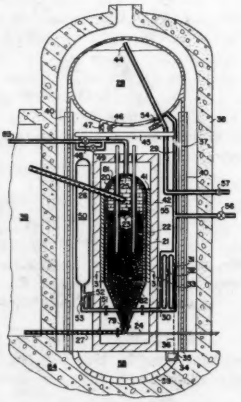
NUCLEAR ENERGY SYSTEM USING PELLETIZED FUEL IN A BOILING LIQUID REACTOR

Glen J. Schoessow, 300 N.W. 34th Ter., Gainesville, Fla. 32607

Filed Apr. 24, 1989, Ser. No. 342,125

Int. Cl.[5] G21C *15/00*

U.S. Cl. 376—381 **4 Claims**



1. A system for producing a superheated vapor by employing a nuclear fission reaction in a reactor containing pelletized fuel, said reactor being a closed pressure vessel partially filled with a reaction medium including a coolant liquid and said pelletized fuel dispersed therein, two or more nuclear reaction control rods adjustably positioned in said medium, means for continuously introducing pellets of fuel into said reaction medium and means for continuously removing pellets of spent fuel from said reaction medium; means for introducing said coolant liquid into said reactor, and means for removing superheated vapor of said coolant liquid from said reaction medium; said pellets of fuel comprising substantially spherical pellets containing a core of porous graphite encased in a high melting point matrix having dispersed therein tiny pellets of a mixture of graphite and nuclear fissionable material, and a substantially spherical coating over said matrix of a metallic alloy having a melting point above about 4000° F.

4,976,914

DEVICE FOR REMOVING A BLOWER FROM A GAS-COOLED NUCLEAR REACTOR

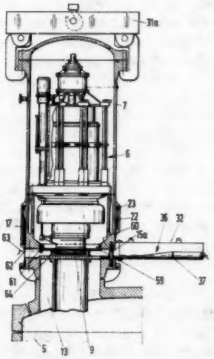
Bruno Sachse, Schriesheim; Hubert Weiskopf, Mannheim; Joachim Engel, Hirschberg-Grossachsen, and Jakob Zintel, Huettenfeld, all of Fed. Rep. of Germany, assignors to Asea Brown Boveri Aktiengesellschaft, Mannheim, Fed. Rep. of Germany

Filed Feb. 6, 1989, Ser. No. 307,337

Claims priority, application Fed. Rep. of Germany, Feb. 5, 1988, 3803434

Int. Cl.[5] G21C *13/06*

U.S. Cl. 376—391 **8 Claims**



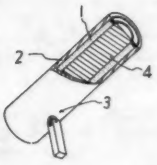
1. In a gas-cooled nuclear reactor including a stream generator housing having an opening formed therein, a blower housing being vertically associated with the steam generator housing at a connection location and having an auxiliary flange projecting therefrom and a bottom, and a blower disposed in the blower housing, a device for removing the blower, comprising a flange ring overlapping the connection location, said flange ring having a lower flange connected to the steam generator housing and an upper flange adjoining the auxiliary flange and maintaining an intermediate space, said flange ring having penetration openings and a lateral opening formed therein, a container flanged to said flange ring at said lateral opening, a transport cradle disposed inside said container, means for vertically moving the blower housing together with the blower creating a free space in said flange ring, a sealing cover supported by said transport cradle for insertion through said lateral opening into said free space and deposition onto the edge of the opening in the steam generator housing, a transport cover concentrically disposed on said sealing cover for insertion through said lateral opening into said free space and coupling to the bottom of the blower housing, and tools to be passed through said penetration openings for locking said transport cover to the bottom of the blower housing.

4,976,915

METHOD FOR FORMING A POWDERED OR A GRANULAR MATERIAL

Takanori Kuroki, Munakata, Japan, assignor to Kuroki Kogyosho Co., Ltd., Fukuoka, Japan

Filed Aug. 1, 1988, Ser. No. 226,583
Int. Cl.[5] B22F 3/06
U.S. Cl. 419—8 18 Claims



1. A method for forming a powdered or a granular material comprising:

(a) putting a volume of a powdered or granular material comprising at least one member selected from the group consisting of a metal, a ceramic and carbon in a metal cylindrical container,

(b) sealing said container,

(c) locally pressing an outer surface of said container with a local pressing member while rotating said container about a longitudinal axis of said container as a rotating center, and

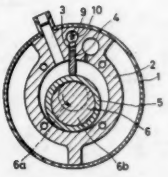
(d) progressively moving said local pressing member along said outer surface of said container to deform said container outer surface, whereby said powdered or said granular material is formed to a shape conforming to the deformed outer surface of said container.

4,976,916

METHOD FOR PRODUCING FERROUS SINTERED ALLOY PRODUCT

Soichi Shimomura, Yono, Japan, assignor to Nippon Piston Ring Co., Ltd., Tokyo, Japan

Division of Ser. No. 125,324, Jan. 25, 1987, Pat. No. 4,859,164.
This application May 26, 1989, Ser. No. 357,270
Claims priority, application Japan, Dec. 6, 1986, 61-291364
Int. Cl.[5] B22F 1/00
U.S. Cl. 419—25 3 Claims



1. A method for producing a ferrous sintered alloy product comprising the steps of:

preparing metal powder mixture primarily comprising iron;

compacting said powder mixture to obtain a powder compact;

sintering said powder compact to obtain a sintered body;

subjecting sub-zero treatment to said sintered body; and,

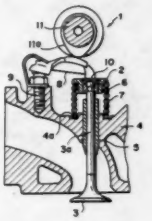
tempering said sub-zero treated sintered body, whereby the resultant sintered alloy product is free from retained austenite.

4,976,917

METHOD OF MANUFACTURING HARDWEARING ALUMINUM ALLOY PART

Makoto Fujita, Hiroshima, Japan, assignor to Mazda Motor Corporation, Shinchi, Japan

Filed May 2, 1990, Ser. No. 517,843
Claims priority, application Japan, May 10, 1989, 1-116624
Int. Cl.[5] G22F 1/00
U.S. Cl. 419—33 7 Claims



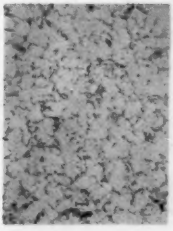
1. A method of manufacturing a hardwearing aluminum alloy part comprising the steps of preforming quench-solidified Al-Si alloy powder which contains more than 12 wt % Si, compression-molding the preforming into an aluminum alloy part, and repeating a plurality of times a heating-and-cooling cycle of heating the aluminum alloy part to a temperature between 440° C. and 500° C. and cooling it to a temperature not higher than 380° C.

4,976,918

ALUMINUM DIE-CASTING ALLOYS

Naomi Nishi; Shigetake Kami, both of Tokyo, and Takashi Yamaguchi, Hiroshima, all of Japan, assignors to Ryobi Limited, Tokyo, Japan

Continuation of Ser. No. 76,435, Jul. 21, 1987, Pat. No. 4,847,048. This application May 15, 1989, Ser. No. 351,886
Claims priority, application Japan, Jul. 21, 1986, 61-171169; Jan. 19, 1987, 62-10823; Apr. 7, 1987, 62-86416; Jun. 3, 1987, 62-140431
The portion of the term of this patent subsequent to Jul. 11, 2006, has been disclaimed.
Int. Cl.[5] C22C 21/00
U.S. Cl. 420—546 7 Claims



5. An aluminum die-casting alloy which comprises about 1.8 to about 3.0 wt % of Mn, about 4.5 to about 8.0 wt % of Mg, about 1.5 wt % or less of Si, balance Al and indispensible impurities.

4,976,919

METHOD FOR MECHANICALLY WORKING COBALT-CONTAINING METAL

Rolf Sköld, and Irene Johansson, both of Stenungsund, Sweden, assignors to Berol Kemi AB, Stenungsund, Sweden

Continuation-in-part of Ser. No. 792,597, Oct. 29, 1985. This application Mar. 4, 1988, Ser. No. 164,466

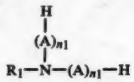
Claims priority, application Sweden, Oct. 30, 1984, 8405422-0

Int. Cl.[5] C23F *11/00*; C10M *103/00, 133/00*

U.S. Cl. 422—7 **24 Claims**

1. A method for reducing corrosion and reducing the release of cobalt into solution while mechanically working cobalt-containing metals, the method comprising:

working said cobalt-containing metals in the presence of a synthetic metal working liquid which is aqueous and alkaline, is comprised of at least 85% water and, as a cobalt release- and corrosion-inhibiting agent, at least one tertiary alkanol amine selected from the group consisting of tertiary alkanol amines having the formulas:



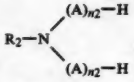
I

wherein:

A is an alkylene oxy group derived from an alkylene oxide having 2–4 carbon atoms,

R_1 is an alkyl group having 1–5 carbon atoms or the group $(A)_n$-H,

n_1 is an integer ranging from 1 to 6, and a ratio of the number of groups derived from ethylene oxide to the total number of groups derived from alkylene oxide ranges from 1:15 to 1:2; and



II

wherein:

R_2 is a hydrocarbon group having 6–18 carbon atoms,

A is an alkylene oxide group derived from an alkylene oxide having 2–4 carbon atoms, and n_2 is an integer ranging from 1 to 5.

4,976,920

PROCESS FOR DRY STERILIZATION OF MEDICAL DEVICES AND MATERIALS

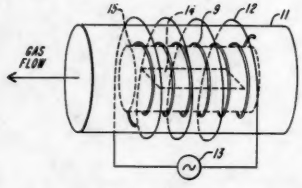
Adir Jacob, 23 Juniper La., Framingham, Mass. 01701

Continuation-in-part of Ser. No. 72,899, Jul. 14, 1987, Pat. No. 4,818,488, which is a continuation-in-part of Ser. No. 19,134, Feb. 25, 1987, Pat. No. 4,801,427. This application Mar. 31, 1989, Ser. No. 331,438

The portion of the term of this patent subsequent to Jan. 31, 2006, has been disclaimed.

Int. Cl.[5] A61L *2/14*; G01N *23/00*

U.S. Cl. 422—23 **20 Claims**



14. A method in accordance with either claims 11 or 13 wherein said medical devices and materials are enclosed within pouches made of permeable material.

4,976,921

KIT FOR CONTACT LENS STERILIZATION AND METHOD FOR CONTACT LENS STERILIZATION

Yoko Itagaki, Kodama, and Masahiro Hiranuma, Honjo, both of Japan, assignors to Hoya Corporation, Tokyo, Japan

Filed Dec. 13, 1988, Ser. No. 283,861

Claims priority, application Japan, Dec. 18, 1987, 62-320460

The portion of the term of this patent subsequent to Oct. 25, 2005, has been disclaimed.

Int. Cl.[5] A61L *2/16*

U.S. Cl. 422—28 **16 Claims**

1. A kit for contact lens cleaning, comprising a compound capable of releasing available chlorine as an oxidizing agent for removing stains adhering to contact lenses and a reducing agent for making nontoxic the oxidizing agent still remaining after stain removal, wherein the oxidizing agent and the reducing agent are each in such a form that the oxidizing agent and the reducing agent do not substantially react with each other in the kit and that when they are placed in water substantially simultaneously, the major portion of the oxidizing agent dissolves int he water more rapidly than the major portion of the reducing agent.

9. A method for contact lens cleaning using a compound capable of releasing available chlorine as an oxidizing agent for removing stains adhering to contact lenses and a reducing agent for making nontoxic the oxidizing agent still remaining after stain removal, the oxidizing agent and the reducing agent being each in such a form that when they are placed in water substantially simultaneously, the major portion of the oxidizing agent dissolves in the water more rapidly than the major portion of the reducing a gent, the method comprising:

(1) placing the oxidizing agent and the reducing agent in water substantially simultaneously to dissolve the major portion of the oxidizing agent;

(2) immediately conducing a cleaning treatment of the lens by oxidizing the agent and a treatment of the residual oxidizing agent by the reducing agent for making the residual oxidizing agent nontoxic, macroscopically in this order.

4,976,922

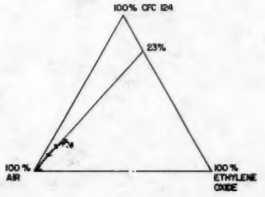
STERILIZATION METHOD

Simon Chippett, Charleston, W. Va., and Stephen A. Conviser, Pelham, N.Y., assignors to Union Carbide Corporation, Danbury, Conn.

Filed Mar. 3, 1989, Ser. No. 318,767

Int. Cl.[5] A61L *2/20*

U.S. Cl. 422—34 **14 Claims**



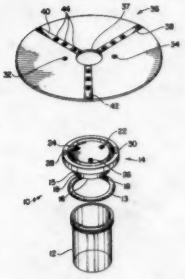
1. A method for sterilizing an article comprising contacting the article with an effective amount of a sterilant mixture comprising from 15 to 30 mole percent ethylene oxide and from 70 to 85 mole percent 1-chloro-1,2,2,2-tetrafluoro-ethane.

4,976,923

SAMPLE CONTAINER

Milton H. Lipsky, West Greenwich, and Andrew Rosner, Barrington, both of R.I., assignors to Rhode Island Hospital, Providence, R.I.

Filed May 12, 1989, Ser. No. 351,456
Int. Cl.[5] G01N *21/00, 33/48, 33/493*
U.S. Cl. 422—58 3 Claims



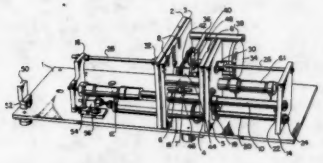
1. A fluid testing apparatus comprising:
a specimen cup for receiving a fluid specimen therein,
a cover assembly which is receivable and securable in covering relation on said specimen cup so that it cooperates therewith to define an enclosed area,
said cover assembly further including an isolation chamber formed therein for containing a reagent portion,
said isolation chamber depending from said cover assembly so that said isolation chamber is located in said enclosed area when said cover assembly is received on said specimen cup,
said isolation chamber including a peripheral sidewall portion having a plurality of preformed apertures therein which open into an interior isolation area, and
said reagent portion being disposed in said interior isolation area and being color sensitive to a predetermined analytical characteristic for testing said fluid specimen once the latter has passed through said apertures into said interior isolation area.

4,976,924

AUTOMATED THERMAL DESORPTION UNIT

John M. McAndless; James R. Hancock, both of Alberta; Donald B. Barnett, Saskatchewan; Orville J. Olm, Saskatchewan; Terry J. A. Locke, Saskatchewan, and John Maybank, Saskatchewan, all of Canada, assignors to The Queen in Right of Canada as represented by the Minister of National Defence, Ottawa, Canada

Filed Apr. 22, 1988, Ser. No. 184,808
Int. Cl.[5] G01N *1/10*
U.S. Cl. 422—99 8 Claims



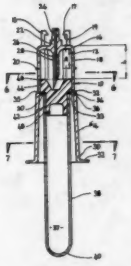
1. A thermal desorption unit, comprising:
a base plate;
a pair of spaced apart plates arranged perpendicularly to said base plate;
locating means for accomodating a cylindrical magazine of tubes between said spaced apart plates;
extraction means for selectively extracting a tube from the magazine;
manipulator means for handling the extracted tube;
heating means for removing contents of the extracted tube;
flushing means for cleaning the extracted tube;
reinsertion means for replacing the extracted tube within the magazine; and
positioner means for moving the tubes within the magazine for selective retrieval;
whereby said unit can accept a magazine of tubes containing samples and produce a magazine of clean tubes ready for reuse.

4,976,925

APPLIANCE DESIGNED FOR SINGLE USE FOR TAKING SAMPLES OF LIQUIDS

Alain R. Porcher, Paris, and Jean-Claude Martin, Segre, both of France, assignors to Allflex Europe S.A., Paris, France

Filed Jan. 6, 1989, Ser. No. 295,061
Claims priority, application France, Jan. 8, 1988, 88 00156
Int. Cl.[5] G01N *1/10, 33/50*
U.S. Cl. 422—100 15 Claims



1. A device for single usage for sampling liquids comprising a hollow mounting tube closed at one end by a base which has a needle mount, said mounting tube slidingly receiving a sampling tube which has a cap of a diameter in a section thereof projecting from the sampling tube greater than that of the sampling tube to thereby form a shoulder which engages with an edge of the sampling tube, said mounting tube having a head portion into which the cap of said sampling tube can be slidingly engaged and a body portion to guide the sampling tube into said head portion, said mounting tube having means to retain the cap within the head portion when said cap has been located therein and thereby prevent the cap from being withdrawn from the head portion and into said body portion, the mounting tube further including means defining a frangible area whereby at least part of said head portion can be detached to permit removal of said cap from said head portion and thereby removal of said cap and sampling tube from said mounting tube.

4,976,926

VACUUM DIAGNOSTIC DEVICE

Vlado I. Matkovich, Glen Cove, N.Y., assignor to Pall Corporation, Glen Cove, N.Y.

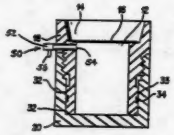
Continuation-in-part of Ser. No. 941,356, Dec. 15, 1986, Pat. No. 4,789,526. This application Jul. 28, 1988, Ser. No. 225,023
Int. Cl.[5] B01L *11/00*
U.S. Cl. 422—101 8 Claims

1. A diagnostic device for testing at least one analyte in a liquid, the diagnostic device comprising:

a housing having an exterior and including a chamber having one portion open to the exterior of the housing and another portion closed from the exterior of the housing:

a porous structure disposed across the open portion of the chamber and hermetically sealed to the housing, the porous structure having a first surface communicating with the exterior of the housing, a second surface communicating with the closed portion of the chamber, and at least one layer which is wettable by a liquid:

a valve in a wall of said housing; and



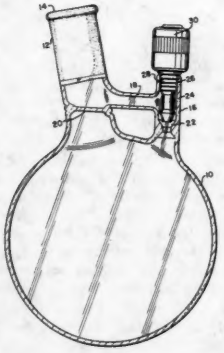
means for increasing the volume of the closed portion of the chamber to thereby decrease the pressure within the closed portion of the chamber, the at least one wettable layer of the porous structure having a bubble point such that, when the wettable layer has been wetted by a liquid, the diagnostic device is capable of maintaining a pressure differential across the porous structure after the volume of the closed portion of the chamber has been increased by said volume increasing means to create a pressure differential across the porous structure.

4,976,927

SOLVENT STORAGE FLASK

Daniel A. Straus, Morgan Hill, Calif., and John F. Babashak, Millville, N.J., assignors to Kontes Glass Company, Vineland, N.J.

Filed Mar. 20, 1989, Ser. No. 325,876
Int. Cl.[5] B01L *3/08*
U.S. Cl. 422—102 **24 Claims**



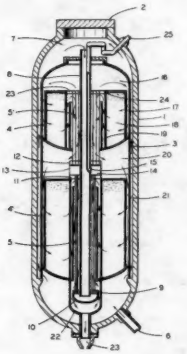
1. A solvent storage flask comprising a fluid reservoir, first tubular neck means having an open mouth, second tubular neck means having an open mouth, said first and second neck means being spaced along the surface of said reservoir, tubular means forming a fluid connection between a portion of said first neck means spaced from said reservoir and a portion of said second neck means spaced from said reservoir, means for sealing said first neck means at a point between said connected portion and said reservoir, valve seat means situated in said second neck means between said connected portion of said reservoir and means in said second neck means, above said valve seat means, for receiving valve stem means, said sealing means comprising a permanent obstruction in said first neck means.

4,976,928

DEVICE FOR PERFORMING EXOTHERMIC CATALYTIC GAS REACTIONS FOR THE SYNTHESIS OF AMMONIA OR METHANOL

Friedrich Föster, Rauschenburgstr. 1; Hans-Gunter Brieke, Godekinstr. 55, both of 4600 Dortmund 30, and Hans-Dieter Marsch, Overhoffstr. 193, 4600 Dortmund 76, all of Fed. Rep. of Germany

Continuation of Ser. No. 672,713, Nov. 19, 1984, abandoned.
This application Dec. 23, 1986, Ser. No. 946,162
Claims priority, application Fed. Rep. of Germany, Nov. 29, 1983, 3343114
Int. Cl.[5] C10C *1/00*
U.S. Cl. 422—148 **6 Claims**



1. A device for performing exothermic catalytic gas reactions for the synthesis of ammonia or methanol, including a high-pressure shell and an insert inside the shell, the insert having at least two superimposed annular cylindrical catalyst containers including gas-permeable inner and outer walls for the radial flow of gas from the outside towards the inside and at least two tubular gas/gas heat exchangers arranged centrally in the catalyst containers, comprising:

(a) a central guide tube extending from a zone above the insert to which said tube is sealed to a point below a lower end of a first one of the gas/gas heat exchangers;

(b) a bonnet disposed beneath said lower end of said first gas/gas heat exchanger serving as a baffle means for directing gas introduced down said guide tube up through said first gas/gas heat exchanger;

(c) a first tube bundle of said first gas/gas heat exchanger installed in a first shell shorter than said tube bundle so as to allow gas to enter and leave at both ends of said first shell, said first tube bundle and said first shell surrounding a lower end of said guide tube and extending through a second one of the catalyst containers, and an upper portion of a tubesheet of said first gas/gas heat exchanger having a gastight and firm connection around said guide tube and a gastight support on an upper rim of the inner wall of said second catalyst container;

(d) a second tube bundle of a second one of the gas/gas heat exchangers installed in a second shell shorter than said second tube bundle so as to allow gas to enter and leave at both ends of said second shell, said second tube bundle and said second shell surrounding an upper end of said guide tube and extending through a first one of the catalyst containers, a lower portion of a tubesheet of

said second gas/gas heat exchanger having a gastight and firm connection around said guide tube, and an upper portion of said tubesheet being movably sealed against a cover of said first catalyst container; and

(e) a chamber defined between said upper portion of said tubesheet of said first gas/gas heat exchanger and said lower portion of said tubesheet of said second gas/gas heat exchanger and in communication with said first and second tube bundles whereby gas directed by said bonnet flows upwardly through said first tube bundle, said chamber and said second tube bundle and then flows downwardly through said first catalyst container, between said second shell and said second tube bundle, through said second catalyst container, and then between said first shell and said first tube bundle, and said first and second gas/gas heat exchangers and said central guide tube connected together to form a unit removably supported by said second catalyst container and detachable from the insert.

4,976,929

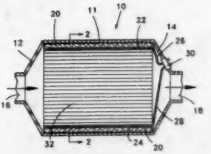
ELECTRICALLY HEATED CATALYTIC CONVERTER

Richard C. Cornelison, Hiram, and William A. Whittenberger, Garrettsville, both of Ohio, assignors to W. R. Grace & Co.-Conn., New York, N.Y.

Continuation of Ser. No. 196,301, May 20, 1988, abandoned. This application Feb. 20, 1990, Ser. No. 483,978

Int. Cl.[5] B01D *53/36;* **F01N** *3/10*

U.S. Cl. 422—174 **17 Claims**



1. In a converter for treating an exhaust gas stream to remove one or more pollutants therefrom and comprising in combination a metallic housing having an exhaust gas inlet and a treated exhaust gas outlet, and an accordion folded non-nesting corrugated thin metal foil honeycomb positioned and arranged in juxtaposition with said metallic housing to radially fill said housing, said corrugated thin metal foil honeycomb having on each surface thereof a refractory metal oxide and/or rare earth metal oxide coating optionally including a heavy metal catalyst deposited thereon, the improvement in quick light-off capability comprising

(a) insulating means positioned between the metallic housing and the accordion folded non-nesting corrugated thin metal foil honeycomb for insolating the housing electrically,

(b) electrical conductors joined to said accordion folded honeycomb to form more than 2 parallel electrical circuits, and

(c) a source of electrical potential connected across said electrical conductors, whereby the entire honeycomb of the electrically heated converter may be selectively electrically heated to a temperature of at least 300 degrees F.

4,976,930

METHOD AND APPARATUS FOR INDUCING PHOTOCHEMICAL REACTION

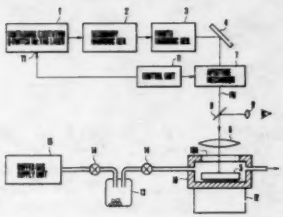
Shunji Kishida; Hiroyuki Yokoyama; Yukio Morishige, and Kunihiko Washio, all of Tokyo, Japan, assignors to NEC Corporation, Tokyo, Japan

Continuation of Ser. No. 129,328, Dec. 3, 1987, abandoned, which is a continuation of Ser. No. 755,128, Jul. 15, 1985, abandoned. This application Aug. 3, 1989, Ser. No. 393,070

Claims priority, application Japan, Jul. 17, 1984, 59-148145; Jul. 17, 1984, 59-148146; Mar. 28, 1985, 60-61807

Int. Cl.[5] B01J *19/08;* **C01G** *37/00;* **H03F** *7/00;* **B23K** *26/00*

U.S. Cl. 422—186.3 **7 Claims**



1. A method of inducing a photochemical reaction to form a film in a micro-area on a substrate, comprising the steps of:

placing said substrate in a closed cell with a window for transmitting an ultraviolet beam therethrough, said substrate being located to oppose said window;

filling a chromium gas subjected to the photochemical reaction upon irradiation of the ultraviolet beam in said cell;

emitting ultraviolet pulses with adjustable pulse repetition frequency of at least 400 hz at a predetermined intensity with a single laser;

adjusting and setting an ultraviolet beam size and shape of at most 100 μm diameter in accordance with a size and shape of an irradiation portion of said substrate;

adjusting and setting the repetition frequency of the ultraviolet beam so as to optimize a thickness of a gas adsorption layer formed in the micro- area immediately prior to a radiation of each of said ultraviolet pulses, for the adjusted ultraviolet beam size and shape; and radiating the ultraviolet beam having the set beam size and shape at the repetition frequency through said window of said cell.

4,976,931

GENERATION OF ANAEROBIC OR MICROAEROPHILIC ATMOSPHERE

Ralph T. Stoermer, III, York County, Pa., and James C. Darner, San Jose, Calif., assignors to Becton, Dickinson and Company, Franklin Lakes, N.J.

Continuation-in-part of Ser. No. 584,174, Feb. 27, 1984, Pat. No. 4,562,051. This application Dec. 12, 1985, Ser. No. 808,223

The portion of the term of this patent subsequent to Dec. 31, 2002, has been disclaimed.

Int. Cl.[5] B01J *8/02*

U.S. Cl. 422—211 **20 Claims**

1. A package for removing oxygen from a gaseous mixture comprising:

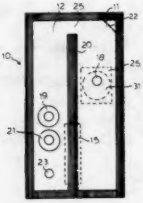
(a) a sealed envelope;

(b) a first compartment within said envelope containing material for generating hydrogen;

(c) a second liquid receiving compartment within said envelope in fluid and gas communication with said first compartment by means of a channel connecting said first and second compartments;

(d) a catalyst unit affixed to the exterior of said envelope, said unit comprising a flame arrestor, a catalyst positioned on the surface of said flame arrestor and a backing mate-

rial positioned over said catalyst and sealably engaged with said flame arrestor; and



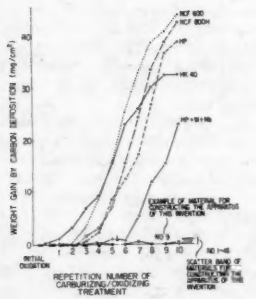
(e) adhering means between said unit and the exterior of said envelope.

4,976,932

CARBON CONTAINING COMPOUND TREATING APPARATUS WITH RESISTANCE TO CARBON DEPOSITION

Keikichi Maeda; Naohiko Kagawa; Kunio Ishii, all of Yokohama, and Takahiro Iijima, Tokyo, all of Japan, assignors to JGC Corporation, Tokyo, Japan

Filed May 29, 1987, Ser. No. 56,218
Claims priority, application Japan, Jul. 23, 1986, 61-174160
Int. Cl.[5] B01J *19/02*
U.S. Cl. 422—240 **13 Claims**


WEIGHT GAIN BY CARBON DEPOSITION (mg/cm²)
REPETITION NUMBER OF CARBURIZING/OXIDIZING TREATMENT
INITIAL OXIDATION
EXAMPLE OF MATERIAL FOR CONSTRUCTING THE APPARATUS OF THIS INVENTION
SCATTER BAND OF MATERIALS FOR CONSTRUCTING THE APPARATUS OF THIS INVENTION

1. An apparatus, with resistance to carbon deposition, for treating carbon-containing compounds at a temperature of higher than about 500° C. wherein a surface of said apparatus contacts a carburizing/oxidizing atmosphere, in which said surface of said apparatus is made of a metallic material consisting of a Fe base alloy, said metallic material containing an amount of chromium in the range of from 41.78 to 70 wt. % and effective to maintain a stable Cr_2O_3 film on said surface of said apparatus during contact with said carburizing/oxidizing atmosphere, said metallic material containing up to 0.6 Wt. % of C, up to 3.0 Wt. % of Si, up to 3.0 wt. % of Mn, up to 3.0 wt. % of Nb, up to 3.0 wt. % of Ti, up to 3.0 wt. % of Zr, up to 3.0 wt. % of W, up to 3.0 wt. % of Mo, and up to 1.0 wt. %, in total, of rare earth elements, and the balance is Fe.

4,976,933

HYDROGEN STREAM PURIFICATION

Thomas G. Mungall, and William E. Moehle, both of Baton Rouge, La., assignors to Ethyl Corporation, Richmond, Va.

Filed Jul. 13, 1987, Ser. No. 72,421
Int. Cl.[5] C01B *33/04, 3/00*
U.S. Cl. 423—210 **2 Claims**

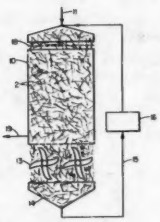
1. Process for removing silane admixed with hydrogen, said process comprising adsorbing said silane on a bed of alkali metal hydroxide supported on activated alumina, said process being conducted at a temperature of from about 50° C. to about 150° C., under substantially anhydrous conditions.

4,976,934

NESTED, RECIRCULATING-FIBER FILTER

Robert E. Maringer, Worthington; Herman Nack, and Richard Razgaitis, both of Columbus, all of Ohio, assignors to Battelle Development Corporation, Columbus, Ohio

Continuation-in-part of Ser. No. 730,710, May 3, 1985, abandoned. This application Dec. 31, 1986, Ser. No. 948,210
Int. Cl.[5] B01D *24/12, 24/28, 24/44, 53/34*
U.S. Cl. 423—210 **11 Claims**



1. A device for removing a pollutant from a fluid stream comprising:

(A) a nested array of fibers having a fluid entrance at a first boundary region of the array and a fluid exit at a generally opposed second boundary region of the array,

(B) means for passing the pollutant-containing fluid stream through the nested array from the fluid entrance to the fluid exit,

(C) means for removing fibers from the second boundary region of the array, and

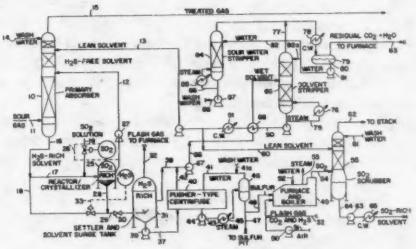
(D) means for recycling the removed fibers from the second boundary region back to the first boundary region of the array, such that there is an overall movement of fibers from the fluid entrance toward the fluid exit and substantially co-current to the fluid stream.

4,976,935

REGENERATION OF SOLVENT IN H_2S REMOVAL FROM GASES

Scott Lynn, Walnut Creek, Calif., assignor to Regents of the University of California, Berkeley, Calif.

Continuation-in-part of Ser. No. 657,809, Nov. 4, 1984, abandoned. This application Jun. 15, 1988, Ser. No. 210,750
Int. Cl.[5] C01B *17/16, 31/20, 17/02*
U.S. Cl. 423—222 **9 Claims**



1. A process for treating a feed gas containing one or more major components and also containing a minor amount of hydrogen sulfide, said method comprising:

(a) providing a solvent which has a higher solvent power for sulfur dioxide than for hydrogen sulfide and a higher solvent power for hydrogen sulfide than for carbon dioxide, propane and butane, said solvent being one which is chemically unreactive, with water, sulfur dioxide and other components of the feed gas and with other substances that it contacts during the process,

and carrying out the following steps continuously:

(b) contacting the feed gas with the solvent in an absorption zone under conditions to absorb the hydrogen sulfide in the solvent leaving a feed gas substantially free of hydrogen sulfide, and forming a solution of hydrogen sulfide in the solvent,

(c) withdrawing feed gas free of hydrogen sulfide and also withdrawing said solution from the absorption zone,

(d) the solution so withdrawn being in the form of a first stream and a second stream which is smaller than the first stream

(e) mixing the first stream in a first reaction zone with a solution of sulfur dioxide in said solvent in proportions in excess of that required stoichiometrically for reaction (1)

$$2\,H_2S+SO_2\rightarrow 3\,S+2\,H_2O \qquad (1)$$

said mixing being carried out in a manner to produce sulfur, water and a solvent phase containing the amount of sulfur dioxide in excess of that required stoichiometrically for reaction (1)

(f) withdrawing from the first reaction zone sulfur, water, a major stream of said solvent phase, and a minor stream of said solvent phase,

(g) recycling the major stream of separated solvent phase resulting from step (f) to the absorption zone,

(h) mixing said second stream in a second reaction zone with the minor stream of solvent phase resulting from step (f) in proportions such that the hydrogen sulfide is in small excess of the amount required stoichiometrically for reaction (1),

(i) separating from said second reaction zone undissolved gas and a stream of solvent containing hydrogen sulfide and water dissolved therein and also separating sulfur

(j) subjecting the solvent stream separated in step (i) to stripping action to separate hydrogen sulfide and water from the solvent, and

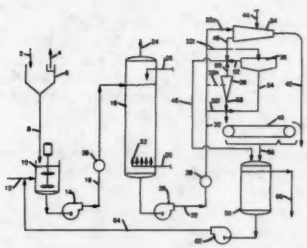
(k) recycling the solvent resulting from step (j) to the absorption zone.

4,976,936

FLUE GAS DESULFURIZATION WITH OXIDATION OF CALCIUM SULFITE IN FGD DISCHARGES

Ronald J. Rathi, Pittsburgh, and Lewis B. Benson, Coraopolis, both of Pa., assignors to Dravo Lime Company, Pittsburgh, Pa.

Filed Aug. 18, 1989, Ser. No. 395,667
Int. Cl.[5] C01B *17/00*; C01F *11/46*
U.S. Cl. 423—242 **12 Claims**



1. In a method of flue gas desulfurization wherein a flue gas, containing sulfur dioxide, is contacted in a liquid scrubber unit with an aqueous slurry formed from calcium hydroxide and magnesium hydroxide, and which contains magnesium hydroxide in an amount to provide an effective magnesium ion content of between 2500 to 9000 parts per million in the liquid scrubber unit, and at least a portion of the slurry, after passage through the scrubber, containing undissolved calcium sulfite is recirculated through a thickener to produce an aqueous sludge containing calcium sulfite, the improvement wherein the calcium sulfite present in the aqueous sludge is oxidized by:

separating undissolved calcium sulfite, in a sludge which contains at least about 20 weight percent solids, from the scrubbing slurry;

contacting said sludge with sulfuric acid to cause dissolution of calcium sulfite in an aqueous solution;

oxidizing the dissolved calcium sulfite in the aqueous solution with an oxygen-containing gas to form a calcium sulfate precipitate in an aqueous media;

separating the calcium sulfate precipitate from the aqueous media; and

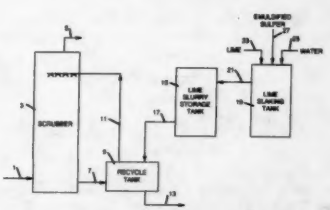
returning aqueous media, separated from the calcium sulfate precipitate, for contact with additional sludge produced in the thickener.

4,976,937

SULFUR DIOXIDE REMOVAL FROM FLUE GASES WITH SULFITE OXIDATION INHIBITION

Yungli J. Lee, Pittsburgh; Lewis B. Benson, Coraopolis, and John W. College, Pittsburgh, all of Pa., assignors to Dravo Lime Company, Pittsburgh, Pa.

Filed Jan. 8, 1990, Ser. No. 462,083
Int. Cl.[5] C01B *17/00*
U.S. Cl. 423—242 **12 Claims**



1. In a method for removal of sulfur dioxide from flue gases in a wet scrubber, wherein an aqueous alkaline earth metal component slurry is contacted in the wet scrubber with the flue gases and said slurry after said contact, containing sulfites and bisulfites, is passed to a recycle tank from which a portion thereof is discharged while the remainder is recycled to said wet scrubber, the improvement comprising:

forming a mixture of calcium thiosulfate and calcium polysulfides by reaction of lime and emulsified sulfur;

adding the mixture so formed to said recycle tank for reaction with the sulfites and bisulfites in said slurry so as to produce thiosulfates from said calcium polysulfides and provide 0.5 to 20 millimoles of thiosulfate per liter of liquid contained in the wet scrubber; and

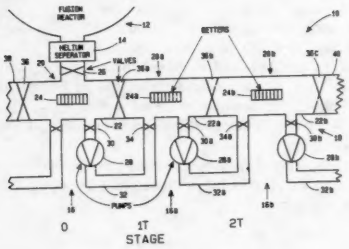
recycling said slurry from the recycle tank to said wet scrubber to remove sulfur dioxide from said flue gases.

4,976,938

HYDROGEN ISOTOPE SEPARATION UTILIZING BULK GETTERS

Randall J. Knize, Los Angeles, Calif., and Joseph L. Cecchi, Lawrenceville, N.J., assignors to The United States of America as represented by the United States Department of Energy, Washington, D.C.

Filed Jul. 14, 1989, Ser. No. 379,841
Int. Cl.[5] B01D *59/00*
U.S. Cl. 423—249 10 Claims



6. A method of separating heavier and lighter hydrogen isotopes from a gaseous mixture thereof, said method comprising the steps of:

providing a bulk getter in a casing said getter having the capability to absorb heavy and light hydrogen isotopes, and the capability to desorb the heavier isotope at a greater rate than the lighter isotope,

introducing the gaseous mixture into the casing,

causing the absorption of the hydrogen isotopes from the gaseous mixture into the getter to produce an initial loading of the getter,

selectively desorbing a portion of the isotopes from the getter to produce a desorbed mixture which is enriched with the heavier isotope,

pumping the desorbed mixture into a separate container,

the remaining gaseous loading in the getter being enriched with the lighter isotope,

desorbing the getter to a substantially greater extent to produce a gaseous mixture which is enriched with the lighter isotope,

and removing the last-mentioned mixture into another container.

4,976,939

PROCESSING OF RARE EARTH ORES

Frederic Fabre, Paris; Jean-Paul Tognet, La Rochelle, and Claude Magnier, Paris, all of France, assignors to Rhone-Poulenc Specialites Chimiques, Courbevoie, France

Continuation of Ser. No. 147,534, Jan. 25, 1988, abandoned, which is a continuation of Ser. No. 905,393, Sep. 10, 1986, abandoned. This application May 3, 1990, Ser. No. 518,340
Claims priority, application France, Sep. 10, 1985, 85 13383
Int. Cl.[5] C01F *1/00*
U.S. Cl. 423—21.1 12 Claims

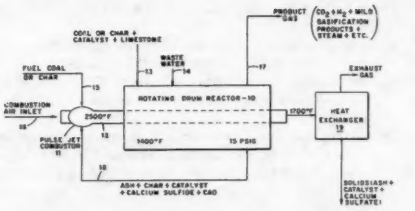
1. A process for the production of rare earth hydroxides, comprising treating a rare earth ore with an aqueous solution of sodium hydroxide having a concentration of from about 20 to about 65% by weight under agitation and essentially constant pressure while maintaining the concentration at essentially constant level, at a temperature of from about 100° C. to about 200° C., with the proviso that the temperature is selected such that water will be evaporated during processing, and wherein the ratio by weight of sodium hydroxide/ore ranges from about 0.95 to about 0.5.

4,976,940

METHOD FOR PRODUCING H2 USING A ROTATING DRUM REACTOR WITH A PULSE JET HEAT SOURCE

Leland E. Paulson, Morgantown, W. Va., assignor to The United States of America as represented by the Department of Energy, Washington, D.C.

Continuation of Ser. No. 193,704, May 13, 1988, abandoned. This application Aug. 2, 1989, Ser. No. 388,714
Int. Cl.[5] C01B *3/02*
U.S. Cl. 423—648.1 7 Claims



1. A method of producing hydrogen by an endothermic steam-carbon reaction comprising the steps of:

rotating an annular drum reactor about an axis;

heating said reactor by a source of heat disposed at a location external to said reactor and generated along said axis at a location radially inwardly from the drum reactor and provided by an external surface of a tailpipe of a pulse jet combustor longitudinally extending along said axis and circumferentially surrounded by said rotating drum reactor;

feeding a fuel including coal dust to the pulse jet combustor to heat the tailpipe for effecting the heating of the rotating drum reactor disposed radially outwardly from the external surface said tailpipe to a temperature of 1200° to 1400° F.;

feeding char or low-rank coal, water, and a catalyst into said rotating drum reactor where they are heated by the source of heat external to the reactor, tumbled and endothermically reacted to form gaseous reaction products; and

withdrawing hydrogen as part of the reaction products from said reactor.

4,976,941

PROCESS FOR OXIDIZING CARBON MONOXIDE IN EXHAUST GAS FROM A SINTERING FURNACE

Takeo Tsunoda; Setsu Takeo; Tatsuya Nobusawa; Norihide Enomoto; Hiroyasu Takahashi; Minoru Watanabe; Yutaka Sasaki, and Kunihiro Tanaka, all of Chiba, Japan, assignors to Kawasaki Steel Corporation, Kobe, Japan

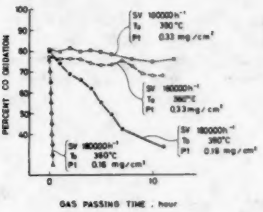
Continuation of Ser. No. 166,409, Mar. 22, 1988, abandoned, which is a continuation of Ser. No. 814,733, Dec. 30, 1985, abandoned. This application Jun. 15, 1989, Ser. No. 368,984
Claims priority, application Japan, Dec. 29, 1984, 59-278809
Int. Cl.[5] B01D *53/36*
U.S. Cl. 423—247 2 Claims

1. A method of oxidizing carbon monoxide present in sintering furnace-exhaust gases containing carbon monoxide comprising the steps of

desulfurizing and denitrating the exhaust gases from the sintering furnace; and

oxidizing the carbon monoxide contained in the desulfurized/denitrated exhaust gases by contacting said exhaust gases with a catalyst comprising a honeycomb structured carrier of cordieritc carrying at least one active

ingredient thereon, said active ingredient being comprised of platinum at a loading weight of at least 0.20 mg/cm^2 of



the apparent outer surface area of the catalyst, at a catalyst inlet temperature of at least 300° C.

4,976,942

METHOD FOR PURIFYING GASEOUS HYDRIDES

Koichi Kitahara; Takashi Shimada, both of Kanagawa; Keiichi Iwata, Niigata, and Noboru Akita, Kanagawa, all of Japan, assignors to Japan Pionics, Ltd., Tokyo, Japan

Filed Sep. 26, 1989, Ser. No. 412,750

Claims priority, application Japan, Sep. 26, 1988, 63-238920; Oct. 31, 1988, 63-273267; Nov. 2, 1988, 63-276177; Nov. 10, 1988, 63-282362; Nov. 16, 1988, 63-287765; Jan. 13, 1989, 1-4748; Jan. 13, 1989, 1-4749; Jan. 13, 1989, 1-4750; Feb. 2, 1989, 1-22684; Feb. 2, 1989, 1-22685

Int. Cl.^{5} B01D *53/00;* C01B *6/34, 19/04, 25/06*

U.S. Cl. 423—294 **7 Claims**

1. A method for purifying a gaseous hydride, which comprises bringing a crude gaseous hydride into contact with at least one member selected from the group consisting of nickel arsenides, nickel phosphides, nickel silicides, nickel selenides, and nickel borides to remove oxygen contained in the crude gaseous hydride.

4,976,943

SPHERICAL, HYDROPHILIC SILICA, METHOD OF ITS PREPARATION AND USE

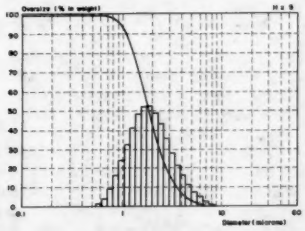
Ingo Pauli, Alzenau; Peter Kleinschmit, Hanau, and Rudolf Schwarz, Alzenau-Wasserlos, all of Fed. Rep. of Germany, assignors to Degussa Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed May 12, 1989, Ser. No. 351,054

Claims priority, application Fed. Rep. of Germany, May 19, 1988, 3817045

Int. Cl.^{5} C01B *33/12*

U.S. Cl. 423—336 **2 Claims**



1. A method of preparing a spherical, hydrophilic silica consisting of compact, massive, non-crystalline particles without inner pores with a particle size of 0.5 to 10 μm, with a BET surface of <50 m^2/g, characterized in that reactants consisting of water vapor and gaseous silicon tetrachloride are heated separately to a temperature of 300° to 400° C., the water vapor and the gaseous silicon tetrachloride are mixed at a temperature of 300° to 400° C. in a molar ratio of H_2O to $SiCl_4$ of 2:1 to 8:1, the resulting gaseous mixture is conducted through a prereaction tube heated to a temperature of 600° to 1200° C., then through a reaction tube wider than said prereaction tube and heated to 600° to 1000° C., with a dwell time of >5 sec., and with a vacuum of at least 100 mm H_2O column and the reaction product is separated from the reaction gases.

4,976,944

PURIFICATION OF SILANE GAS

Bernard Pacaud, Nanterre; Jean-Michel Popa, Drancy, and Claude-Bernard Cartier, Villeneuve/Saint/Georges, all of France, assignors to Rhone-Poulenc Chimie, Courbevoie, France

Filed Oct. 24, 1988, Ser. No. 261,408

Claims priority, application France, Oct. 28, 1987, 87 14906

Int. Cl.^{5} C01B *33/04;* B01D *53/02*

U.S. Cl. 423—347 **22 Claims**

1. A process for purification of impure gaseous silane comprising contacting such silane with a solid sorption mass comprising copper values, said copper values existing primarily in an oxidation state of 2^+.

4,976,945

PROCESS FOR PRODUCING CARBON BLACK

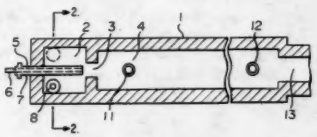
Shinichi Kanamaru; Shushichi Yoshimura; Hideyuki Hisashi, and Akinori Sakaue, all of Kitakyushu, Japan, assignors to Mitsubishi Kasei Corporation, Tokyo, Japan

Filed May 24, 1989, Ser. No. 356,211

Claims priority, application Japan, May 24, 1988, 63-126825

Int. Cl.^{5} C01B *31/02*

U.S. Cl. 423—450 **3 Claims**



1. A process for producing carbon black by thermally decomposing a hydrocarbon starting material in a production furnace by introducing the starting material to a high temperature zone heated by a high temperature combustion gas formed by burning a fuel and an oxygen-containing gas by a high temperature combustion gas-generating burner, characterized in that an alkali metal compound or alkaline earth metal compound or a mixture thereof is (A) introduced from an alkali burner which burner is used for ionizing the alkali metal compound or alkaline earth metal compound, and which is set independently from said high temperature combustion gas-generating burner that burns a mixture of a fuel and an oxygen-containing gas, or (B) ionized in an ionizing furnace used for ionizing the alkali metal compound or alkaline earth metal compound or a mixture thereof, and then introducing said compound or mixture thereof into the production furnace.

4,976,946

SEPARATION OF POTASSIUM SALTS

Ian R. King, South Wootton, England, assignor to The Dow Chemical Company, Midland, Mich.

Filed Feb. 9, 1990, Ser. No. 477,683
Int. Cl.[5] C01D 3/02; C07D 211/72
U.S. Cl. 423—490 16 Claims

1. A process for separately recovering potassium fluoride and a potassium salt of an organic acid from an aqueous mixture containing both, which method comprises combining the aqueous mixture with a sufficient amount of dipolar, aprotic solvent to (a) cause two liquid phases to form, one aqueous based and the other dipolar, aprotic solvent based, and (b) contain the potassium salt of an organic acid as a solute in the dipolar, aprotic solvent based phase, and, thereafter, separating the phases so as to recover the potassium fluoride in the aqueous based phase and to recover the potassium salt of an organic acid in the dipolar, aprotic solvent based phase.

4,976,947

PROCESS FOR THE RECOVERY OF ELEMENTAL IODINE FROM ALKYL IODIDES

Victor H. Agreda, and Guy R. Steinmetz, both of Kingsport, Tenn., assignors to Eastman Kodak Company, Rochester, N.Y.

Filed Feb. 20, 1990, Ser. No. 481,530
Int. Cl.[5] C01B 7/14, 7/13; C07B 53/08
U.S. Cl. 423—502 1 Claim

1. Process for the continuous conversion of methyl iodide to acetic acid and elemental iodine by the steps comprising:

(1) contacting in a carbonylation zone a mixture of methyl iodide and water with carbon monoxide in the presence of a carbonylation catalyst under carbonylation conditions of pressure and temperature;

(2) removing from the carbonylation zone a product mixture comprising acetic acid, hydrogen iodide, water and catalyst;

(3) feeding the product mixture of (2) to a catalyst separation zone to obtain (a) a liquid stream comprising catalyst and a minor amount of the product mixture for recycle to carbonylation zone (1) and (b) a vapor stream comprising acetic acid, hydrogen iodide and water;

(4) feeding the vapor stream of (3) to a distillation zone and recovering (a) an acetic acid-water mixture and (b) a hydrogen iodide water mixture from the distillation zone; and

(5) contacting the hydrogen iodide-water mixture from (4) with oxygen-containing gas in the liquid phase in an oxidation zone from which is obtained (a) a liquid stream comprising a major portion of the water fed and (b) a liquid stream comprising elemental iodine and a minor portion of the water fed.

4,976,948

PROCESS FOR PRODUCING FREE-FLOWING CHROMIUM OXIDE POWDERS HAVING A LOW FREE CHROMIUM CONTENT

Vidhu Anand, Sayre; David L. Houck, Towanda, and Dennis C. Smouse, Monroeton, all of Pa., assignors to GTE Products Corporation, Stamford, Conn.

Filed Sep. 29, 1989, Ser. No. 416,754
Int. Cl.[5] C01G 37/02
U.S. Cl. 423—607 3 Claims

1. A process for producing chromium oxide powders, said process comprising:

(a) forming an aqueous slurry wherein the solids content is a mixture consisting essentially of in percent by weight about 5 to about 15 chromium acetate and the balance chromium oxide;

(b) agglomerating said mixture;

(c) sintering the resulting agglomerated mixture in a hydrogen atmosphere at a temperature of about 1400° C. to about 1550° C. in metallic vessels to form a sintered chromium oxide powder;

(d) entraining said sintered chromium oxide powder in a carrier gas;

(e) passing said sintered chromium oxide powder and said carrier gas through a plasma flame at a power of about 10 to about 80 kW using an inert gas as the plasma gas; and

(f) cooling the resulting plasma heated chromium oxide powder to produce free flowing chromium oxide powder having a free chromium content of less than about 1% by weight.

4,976,949

CONTROLLED RELEASE DOSAGE FORM

James H. Meyer, Santa Monica, Calif.; Gordon L. Amidon, and Jennifer B. Dressman, both of Ann Arbor, Mich., assignors to The University of Michigan, Ann Arbor, Mich.

Continuation of Ser. No. 791,586, Oct. 25, 1985, abandoned.
This application Jan. 29, 1990, Ser. No. 474,633
Int. Cl.[5] A61K 9/22; G01N 37/00
U.S. Cl. 424—1.1 19 Claims

1. A drug dosage system of the type wherein an active drug is administered orally to a living being so as to be transported by a chyme produced by the living being in response to an ingested meal, the chyme having a solid portion, the drug dose system comprising a multiplicity of subunits of the active drug, said subunits each having a substantially spherical configuration and a predeterminable density and diameter, said density and diameter being selectably related to one another in accordance with a relationship:

$$\left[N_\nu = \frac{\Delta\rho * d_p^2}{\mu * \langle v \rangle} \right]$$

$$N_\nu = \frac{g\Delta\rho * d_p^2}{\mu * \langle v \rangle}$$

wherein N_ν is functionally related to the gastric residence time of said subunits relative to the liquid fraction of the meal, g is the gravitational constant, $\Delta\rho$ is the difference in density between said subunits and the chyme, d_p is the diameter of said subunits, μ is the viscosity of the chyme, and $\langle v \rangle$ is the linear velocity of the chyme; and

wherein the value of $|\Delta\rho| * d_p^2$ is selected to achieve a predetermined rate of transport of said subunits and concomitant emptying thereof with the solid portion of the chyme.

4,976,950

BONE MARROW SUPPRESSING AGENTS

Jaime Simon, Angleton; Joseph R. Garlich, Lake Jackson; David A. Wilson, Richwood, and Kenneth McMillan, Richwood, all of Tex., assignors to The Dow Chemical Company, Midland, Mich.

Continuation-in-part of Ser. No. 284,875, Dec. 19, 1988, Pat. No. 4,882,142. This application Nov. 13, 1989, Ser. No. 435,096
The portion of the term of this patent subsequent to Nov. 21, 2006, has been disclaimed.
Int. Cl.[5] A61K 43/00; C07F 5/00
U.S. Cl. 424—1.1 21 Claims

1. A method for suppressing bone marrow which comprises administering to a mammal in need of such treatment a bone marrow suppressing amount of a bone marrow suppressing composition comprising the radionuclide Yttrium-90 complexed with at least one macrocyclic aminophosphonic acid ligand containing a 1,4,7,10-tetraazacylododecane moiety and wherein the phosphonic acid functionality is attached to the nitrogen of the macrocyclic polyamine through an alkylene group or a physiologically acceptable salt thereof.

4,976,951

DENTAL CARIES DIAGNOSTIC AND LOCALIZATION TECHNIQUE

Melvyn Rosenberg, 12 Yeda Am, Ramat Gan 52526; Ilana Eli, 26 Shazar, Ramat Gan 52247, and Ervin Weiss, 9 Lipsky, Tel-Aviv 62195, all of Israel

Filed Aug. 28, 1985, Ser. No. 770,201
Int. Cl.[5] A61K 49/00; C12Q 1/00, 1/24, 1/04
U.S. Cl. 424—7.1 19 Claims

1. A method for detecting the presence, extent and location of a specified microorganism on a surface, comprising:

(a) contacting the surface with a solid substrate containing at least one substance essential for the growth of the specified microorganism;

(b) removing said solid substrate from the surface and immersing it in a liquid growth medium lacking said at least one substance essential for the growth of the specified microorganism but otherwise having the necessary growth ingredients for growing the specified microorganism; and

(c) incubating said liquid growth medium with the solid substrate immersed therein to promote the growth of the specified microorganism at the interface between the solid substrate and the liquid medium.

4,976,952

MACROMOLECULAR, SURFACE-ACTIVE, QUATERNARY, N-SUBSTITUTED CHITOSAN DERIVATIVES AS WELL AS COSMETIC COMPOSITION BASED ON THESE NEW CHITOSAN DERIVATIVES

Günther Lang, Reinheim, and Harald Wendel, Ober-Ramstadt, both of Fed. Rep. of Germany, assignors to Wella Aktiengesellschaft, Darmstadt, Fed. Rep. of Germany

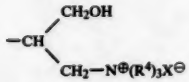
PCT No. PCT/EP88/00183, § 371 Date Nov. 14, 1988, § 102(e) Date Nov. 14, 1988, PCT Pub. No. WO88/08698, PCT Pub. Date Nov. 17, 1988
PCT Filed Mar. 10, 1988, Ser. No. 274,804
Claims priority, application Fed. Rep. of Germany, May 9, 1987, 3715576
Int. Cl.[5] A61K 7/00
U.S. Cl. 424—47 17 Claims

1. A cosmetic composition for the treatment of hair and skin which contains in a suitable cosmetic base a macromolecular, surface-active, quaternary N-substituted compound which is derived from chitosan and has the general formula (I)

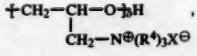
$$HO[C_6H_{11-x-y-z}NO_4(R^1)_x(R^2)_y(R^3)_z]_pH \quad (I),$$

wherein x can assume any numerical value from 0.04 to 0.4, y can assume any numerical value from 0.04 to 0.92 and z can assume any numerical value from 0.04 to 0.92 on the condition that $(x+y+z) \leqq 2$, p represents an integer from 100 to 100,000, R^1 represents the radical

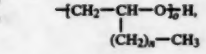
R^2 represents the radical



or



wherein R^4 represents a to C_4-alkyl group, x represents Cl, Br, I or CH_3SO_4 and o represents an integer from 1 to 5, and R^3 represents the radical



wherein n represents an integer from 5 to 20 and o represents an integer from 1 to 5.

4,976,953

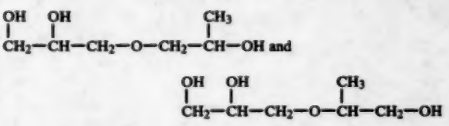
SKIN CONDITIONING/CLEANSING COMPOSITIONS CONTAINING PROPOXYLATED GLYCEROL DERIVATIVES

Thomas V. Orr, Cincinnati, and Anthony D. Sabatelli, Hamilton, both of Ohio, assignors to The Procter & Gamble Company, Cincinnati, Ohio

Filed Mar. 6, 1987, Ser. No. 23,059
Int. Cl.[5] A61K 7/00
U.S. Cl. 424—47 15 Claims

1. A topical skin care composition comprising:

(a) from about 1% to about 60% by weight of a propoxylated glycerol derivative selected from the group consisting of:



and mixtures thereof; and

(b) a cosmetically-acceptable topical carrier.

4,976,954

ANTICARIOGENIC COMPOSITIONS

Carl J. Kleber, and Mark S. Putt, both of Ft. Wayne, Ind., assignors to Purdue Research Foundation, West Lafayette, Ind.

Continuation-in-part of Ser. No. 937,196, Dec. 2, 1986, abandoned. This application Nov. 23, 1987, Ser. No. 121,993
Int. Cl.[5] A61K 7/16, 7/18, 7/30
U.S. Cl. 424—52 21 Claims

1. A palatable anticariogenic composition adapted for application to teeth, said composition having a pH of about 2.5 to about 5.0 and comprising

about 10 to about 50,000 ppm aluminum ions reacting with the teeth,

water, and

nonionic surfactants comprising (1) polyoxyethylene derivatives of sorbitan fatty acid esters and (2) block copolymers of propylene oxide and ethylene oxide, said surfactants being present in an amount effective to stabilize the anticariogenic composition.

4,976,955

ORAL HYGIENE COMPOSITION

Barry M. Libin, 15 Thornhedge Rd., Bellport, N.Y. 11713

Continuation-in-part of Ser. No. 438,803, Nov. 20, 1989. This application Mar. 12, 1990, Ser. No. 491,726
Int. Cl.[5] A61K 9/20, 33/40
U.S. Cl. 424—53 9 Claims

1. A normally inactive and storable wet aqueous alkaline cream or paste oral hygiene composition which when the composition is applied to the surface of the teeth and adjacent gingival tissue, it then interacts with saliva in the mouth and is rendered active, said composition consisting essentially of from 0.5% to 40% by weight of de-ionized water, in an amount effective to confer wetness to the cream or paste containing:

(a) magnesium peroxide; and

(b) magnesium hydroxide in an amount relative to the magnesium peroxide sufficient to impart alkalinity to the composition to render it inactive and storable, said composition when applied then interacting with said saliva which imparts acidity thereto, thereby activating the composition, and causing the magnesium peroxide to release active oxygen to effect whitening of the teeth surfaces and acting to destroy anerobic bacteria associated with dental plaque.

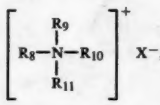
4,976,956

METHOD AND COMPOSITION TO IMPART IMPROVED CONDITIONING PROPERTIES TO THE HAIR

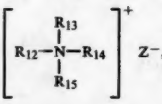
Jeremy E. Noe, Joliet, Ill., assignor to Helene Curtis, Inc., Chicago, Ill.

Filed Jul. 24, 1989, Ser. No. 383,729
Int. Cl.[5] A61K 7/075
U.S. Cl. 424—70 **50 Claims**

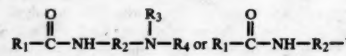
1. A hair-treating composition comprising at least about 0.35% by weight of a water-soluble quaternary ammonium compound, wherein the water-soluble quaternary ammonium compound has the general structure:



wherein R_8 is an alkyl group including from about 8 to about 18 carbon atoms; R_9 is selected from the group consisting of an alkyl group including from about 8 to about 18 carbon atoms, a hydrogen atom, a methyl group, an ethyl group, a hydroxymethyl group and a hydroxyethyl group; R_{10} is selected from the group consisting of a benzyl group, a hydrogen atom, a methyl group, an ethyl group, a hydroxymethyl group and a hydroxyethyl group; R_{11} is selected from the group consisting of a hydrogen atom, a methyl group, an ethyl group, a hydroxymethyl group and a hydroxyethyl group; and X is selected from the group consisting of chloride, methosulfate, ethosulfate and nitrate; from about 0.4% to about 15% by weight of an oil-soluble quaternary ammonium compound, wherein the oil-soluble quaternary ammonium compound has the general structure:



wherein R_{12} is an alkyl group including from about 14 to about 22 carbon atoms; R_{13} is selected from the group consisting of an alkyl group including from about 14 to about 22 carbon atoms, a methyl group and an ethyl group; R_{14} is selected from the group consisting of a benzyl group, a methyl group and an ethyl group; R_{15} is selected from the group consisting of a methyl group and an ethyl group; and Z is selected from the group consisting of chloride, bromide, methosulfate, ethosulfate, tosylate, acetate and phosphate; from about 0.1% to about 5% by weight of an acid-neutralized amidoamine, wherein the acid-neutralized amidoamine comprises an amidoamine compound having the general structure:



wherein R_1 is a fatty acid chain containing from about 11 to about 21 carbon atoms; R_2 is an alkylene group containing from two to about four carbon atoms; R_3 is hydrogen, a methyl group, an ethyl group or a hydroxyalkylene group containing from one to about three carbon atoms; R_4 is a methyl group, an ethyl group or a hydroxyalkylene group containing from one to about three carbon atoms; and Y is an organic heterocyclic nitrogen-containing moiety; from about 0.1% to about 2% by weight of a polydimethylsiloxane, wherein the polydimethylsiloxane is selected from the group consisting of a linear polydimethylsiloxane having a viscosity at 25° C. in the range from about 0.5 centistokes to about 5 centistokes and a boiling point at atmospheric pressure ranging from about 100° C. to about 250° C., a cyclic polydimethysiloxane having a viscosity at 25° C. of from about 2 to about 6 centistokes and a boiling point at atmospheric pressure ranging from about 170° C. to about 220° C., and combinations thereof; and a suitable liquid vehicle.

4,976,957

PROCESS FOR THE PRODUCTION OF RECOGNINS AND THEIR CHEMORECIPROCALS

Samuel Bogoch, 46 E. 91st St., New York, N.Y. 10028

Continuation-in-part of Ser. No. 922,799, Jul. 7, 1978, Pat. No. 4,298,590, and a continuation of Ser. No. 19,078, Mar. 9, 1979, abandoned, which is a continuation-in-part of Ser. No. 941,940, Sep. 13, 1978, abandoned, which is a continuation of Ser. No. 852,200, Nov. 17, 1977, Pat. No. 4,196,186, which is a continuation of Ser. No. 621,112, Oct. 9, 1975, abandoned, which is a continuation-in-part of Ser. No. 553,075, Feb. 25, 1975, abandoned, and a continuation-in-part of Ser. No. 550,432, Feb. 18, 1975, abandoned, and a continuation-in-part of Ser. No. 450,404, Mar. 12, 1974, abandoned, and a continuation-in-part of Ser. No. 385,451, Aug. 3, 1973, abandoned. This application Jul. 9, 1981, Ser. No. 281,883
Int. Cl.[5] A61K *39/00, 45/02;* G01N *33/54*
U.S. Cl. 424—88 **11 Claims**

1. A process for the production of a product, Recognin L, which comprises extracting lymphoma tumor cells grown in culture with a neutral buffer by repeated disruption of the cells to solubilize protein fractions, separating from the resulting extract of solubilized proteins the fraction having a pK range of from about 1 to 4, and isolating therefrom a product having a molecular weight of about 8000 as determined by thin layer gel chromatography, said product, Recognin L, characterized by forming a single line precipitate with its specific antibody in quantitative precipitin tests and Ouchterlony gel diffusion tests, being soluble in water and aqueous solutions having an acid or neutral pH, and insoluble at an alkaline pH, having a spectrophotometric absorption peak wave length of 280 mu, a molecular weight of about 8000 and further having an amino acid composition approximately as follows:

	Approximate Number of Residues
Aspartic Acid	8
Threonine	5
Serine	5
Glutamic Acid	10
Proline	5
Glycine	13
Alanine	10
Valine	6
½ Cysteine	1
Methionine	1
Isoleucine	4
Leucine	7
Tryosine	1
Phenylalanine	3
Lysine	6
Histidine	2
Arginine	5
Approximate Total =	92

tne amino acids cysteic acid, hydroxyproline, norleucine, ammonia, isodesmosine, desmosine, hydroxylysine, lysinonorleu-

cine and gamma-aminobutyric acid being absent in detectable amounts.

4,976,958

MYCOBACTERIAL RECOMBINANTS AND PEPTIDES

Thomas Shinnick, Atlanta, Ga., and Richard Houghten, Solana Beach, Calif., assignors to Scripps Clinic and Research Foundation, La Jolla, Calif.

Continuation-in-part of Ser. No. 19,529, Feb. 26, 1987. This application Feb. 24, 1988, Ser. No. 159,667

Int. Cl.[5] A61K *39/02, 37/02;* C07K *3/00*

U.S. Cl. 424—92 14 Claims

1. A polymer comprising a plurality of peptide repeating units, each of said peptide repeating units consisting essentially of an amino acid residue sequence that corresponds substantially to a sequence of a 65KD mycobacterial cell wall protein-a, said peptide repeating units having the capacity of stimulating T cells immune to the mycobacteria of said 65KD mycobacterial cell wall protein-a, wherein said peptide repeating units consist essentially of a sequence, written from left to right and in the direction from aminoterminus to carboxy-terminus, represented by a formula selected from the group consisting of

A V L E D P Y I L L V S S K V;
L L V S S K V S T V K D L L P;
L L P L L E K V I G A G K P L;
A I L T G G O V I S E E V G L;
I A F N S G L E P G V V A E K;
A R R G L E R G L N A L A D A V K V;
E K I G A E L V K E V A K K;
G L K R G I E K A V E K V T E T L; and
I E D A V R N A K A A V E E G.

4,976,959

T-PA AND SOD IN LIMITING TISSUE DAMAGE

Henry Berger, Jr., Cary, and Crist J. Frangakis, Durham, both of N.C., assignors to Burroughs Wellcome Co., Research Triange Park, N.C.

Filed May 12, 1986, Ser. No. 862,057

Int. Cl.[5] A61K *37/62, 37/50;* C12N *9/02, 9/50*

U.S. Cl. 424—94.2 13 Claims

1. A method for inhibiting damage to jeopardized tissue during reperfusion in a mammal, which comprises administering to said mammal an effective amount of t-PA in combination with an effective amount of SOD to provide a synergistic effect.

4,976,960

FOOD SUPPLEMENTS

Shlomo Grossman, and Michael Albeck, both of Ramat Gan, Israel, assignors to Bar Ilan University, Ramat Gan, Israel

Filed Oct. 2, 1987, Ser. No. 104,419

Claims priority, application Israel, Oct. 17, 1986, 80351; Nov. 26, 1986, 80783

Int. Cl.[5] A61K *35/78*

U.S. Cl. 424—195.1 21 Claims

1. A food supplement which comprises in combination (i) as an essential antioxidant ingredient, a material which is stable for an extended period of time, at least in the dry state, under ambient conditions, said material being selected from the group consisting of water-soluble extracts prepared by aqueous extraction of plant tissue selected from leaf and stem tissue and fractions separable from said extracts by chromatography, provided that antioxidant activity is identifiable in said material and that the latter is present in an antioxidant effective amount and (ii) an orally ingestible diluent or carrier, said tissue having been obtained from at least one plant selected from the group consisting of (A) member of the plant families Aizoceae, Amarathaceae, Caryophyllaceae, Chenopodiaceae except Spinacia, Nyctaginaceae, Phytolaccaeae, Portulacaceae and (B) Spinacia, Trifolium, Medicago, Zea, Nicotiana, Pennisetum and Allium.

4,976,961

ENCAPSULATED COSMETIC MATERIALS AND PROCESS OF MAKING

Robert J. Norbury, Cottage Grove, and Robert W. H. Chang, Roseville, both of Minn., assignors to Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Filed Jul. 18, 1986, Ser. No. 887,799

Int. Cl.[5] A61K *9/50, 9/66;* B01J *13/18*

U.S. Cl. 424—401 22 Claims

1. Microcapsules of encapsulated oil comprising an oil having a polymeric thickener therein which increases the viscosity of said oil by at least 70 cp encapsulated by an aminoplast polymeric shell, said microcapsules having average diameters between 50 and 2000 microns.

19. A process for encapsulating oils comprising mixing an oil having a viscosity of between 2 and 150 cp at 20° C. and a molecular weight in excess of 100 with an additive that increases the viscosity of said oil by at least 70 cp and which is dispersible or soluble in said oil, then encapsulating said oil with said additive by condensing an aminoplast resin to produce microcapsules having average diameters of between 50 and 2000 microns.

4,976,962

BIODEGRADABLE POLYPEPTIDE AND THE USE THEREOF FOR THE GRADUAL RELEASE OF DRUGS

Daniel Bichon, Les Lieux dits "Les Chenevières" 16, rue de Vallard, 74240 Gaillard, France, and Bernard Lamy, Chemin Jules Vuy 23, 1227 Carouge, Switzerland

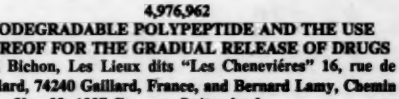
Division of Ser. No. 788,408, Oct. 17, 1985, Pat. No. 4,888,169. This application Jul. 11, 1989, Ser. No. 378,072

Claims priority, application Switzerland, Oct. 19, 1984, 5021/84

Int. Cl.[5] A61F *2/00;* A61K *9/48, 9/52, 9/20*

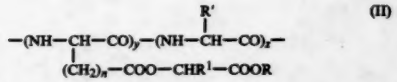
U.S. Cl. 424—424 24 Claims

1. A pharmaceutical composition comprising an effective amount of a drug carried by a polypeptide comprising a member of the group consisting of (a) polymers corresponding to the formula



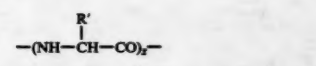
(I)

in which R^1 is a lower alkyl or hydrogen, R being an aliphatic or aromatic radical or R and R^1 are bound to one another to form a hydrocarbon bridge of two or three links which may or may not be substituted; and (b) polymers corresponding to the formula:



(II)

wherein the groups R and R^1 have the meanings given above and wherein



is an uncarboxylated or carboxylated amino acid moiety of which the —COOH is free or partially or completely esterified; n is 1 to 2 and x is equal to y+z is selected so that the molecular weight of the polypeptide is not less than 5000 D, the drug being progressively released as a result of the biodegradation of the polypeptide carrier.

4,976,963

RUMINANT FEED ANTACID CONTAINING POTASSIUM, SODIUM AND CHLORINE

Brian R. Schricker, and Vikram P. Mehrotra, both of Terre Haute, Ind., assignors to Pitman-Moore, Inc., Lake Forest, Ill.

Continuation of Ser. No. 877,313, Jun. 23, 1986, Pat. No. 4,904,473. This application Oct. 2, 1989, Ser. No. 415,949

Int. Cl.[5] A23K *1/18;* A61K *31/10, 33/08*

U.S. Cl. 424—438 7 Claims

1. A pellet produced according to a process which comprises:

forming a mixture of an antacid selected from the group consisting of sodium and magnesium antacids and an electrolyte selected from the group consisting of potassium, sodium, and chlorine-containing electrolytes, said electrolyte and said antacid having a particle size of less than 100 Tyler mesh, said electrolyte supplying said pellet with sufficient potassium, sodium and chlorine so that the weight ratio in said pellet is from about 1.5 to about 1.8 parts potassium and from about 1.2 to about 1.5 parts chlorine per part sodium, and sufficient potassium to provide about 0.8 to about 1 weight parts of potassium per weight part of any magnesium present; and

agglomerating said mixture to form particles having an average particle size of between about 48 and 8 Tyler mesh.

4,976,964

MEDICAMENT FORMULATION CONTAINING DIHYDROPYRIDINES AND A PROCESS FOR ITS PREPARATION

Klaus Schlossmann, Wuppertal; Alfred Zembrod, Bergisch-Gladbach; Stanislav Kazda, Wuppertal; Peter Serno, Cologne, and Bernd Klinksiek, Bergisch-Gladbach, all of Fed. Rep. of Germany, assignors to Bayer Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

Filed Apr. 16, 1986, Ser. No. 852,584

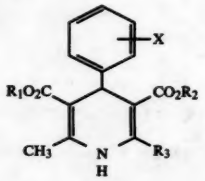
Claims priority, application Fed. Rep. of Germany, Apr. 27, 1985, 3515335

Int. Cl.[5] A61K *37/22, 25/26;* B32B *5/16;* B01J *13/02*

U.S. Cl. 424—450 15 Claims

1. An aqueous composition of pH 3 to 8.5 having dispersed therein liposomes with an average diameter of 20–1000 nm, the following constituents in the indicated amounts by weight forming the liposome membrane:

(a) one part by weight of a dihydropyridine of the formula



in which

R_1 is C_1–C_4-alkyl, optionally substituted by C_1–C_3- alkoxy,

R_2 is C_1–C_{10}-alkyl, optionally substituted by C_1–C_3-alkoxy, trifluoromethyl, N-methyl-N-benzyl-amino or benzyl,

R_3 is C_1–C_4-alkyl, cyano or hydroxymethyl, and X is 2-or 3-nitro, 2,3-dichloro, a 2,3-ring member consisting of =N—O—N= or 2- or 3-trifluoromethyl, and

(b) 5–500 parts of lipids.

4,976,965

CORONARY AFFECTING MEDICINAL COMPOSITION

Juergen Block, Schlob Ricklingen; Lutz Feicho, Burgdorf; Alwin Sobe, Sarstedt, and Martin Wischniewski, Neustadt/Rbge., all of Fed. Rep. of Germany, assignors to Kali-Chemie Pharma GmbH, Hanover, Fed. Rep. of Germany

Filed Aug. 31, 1987, Ser. No. 91,555

Claims priority, application Fed. Rep. of Germany, Apr. 30, 1987, 3714402.2

Int. Cl.[5] A61K *9/64*

U.S. Cl. 424—456 9 Claims

1. A medicinal composition for administration through the mouth, said composition being selected from the group consisting of chewable gelatine capsules and sublingual sprays and comprising a mixture of an effective coronary activity affecting amount of a coronary activity affecting active substance selected from the group consisting of isosorbide nitrates and dihydropyridines, and at least 10% by weight of an alkylene glycol ether corresponding to the formula $XO(RO)_nH$ in which X represents C_1 to C_4 alkyl, R represents CH_2-CH_2 and n is 2, wherein said composition is essentially free of polyvinyl-pyrrolidone (PVP).

4,976,966

DELAYED RELEASE OSMOTICALLY DRIVEN FLUID DISPENSER

Felix Theeuwes, Los Altos, and Patrick S. L. Wong, Palo Alto, both of Calif., assignors to ALZA Corporation, Palo Alto, Calif.

Filed Dec. 29, 1988, Ser. No. 291,725

Int. Cl.[5] A61K *9/20*

U.S. Cl. 424—473 38 Claims

1. An osmotically driven fluid dispenser comprising:

(a) a shaped membrane defining a compartment, the compartment containing an osmotically effective solute composition, said membrane being at least in part permeable to water and having a port from which a solution of the solute may be dispensed from the compartment;

(b) a cover sealing the membrane from an exterior aqueous environment, at least a portion of the cover being comprised of a material selected from the group consisting of semipermeable and microporous materials;

(c) a wicking layer positioned between the membrane and the cover and sealed within the cover; and

(d) a water swellable composition operatively positioned within the cover, wherein said water-swellable composition is capable of absorbing water which passes through the material, expanding over a predetermined activation period, displacing the membrane relative to the cover and

thereby exposing the wicking layer and the membrane to the aqueous environment.

4,976,967

RESIN MODULATED DRUG DELIVERY DEVICE FOR THE DELIVERY OF HMG-COA REDUCTASE INHIBITOR SALTS

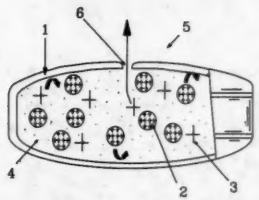
Gregory A. McClelland; Gaylen M. Zentner, and Stefano A. Pogany, all of Lawrence, Kans., assignors to Merck & Co., Inc., Rahway, N.J.

Continuation-in-part of Ser. No. 81,090, Aug. 13, 1987, Pat. No. 4,795,644, and a continuation-in-part of Ser. No. 91,571, Aug. 31, 1987, Pat. No. 4,814,183. This application Nov. 21, 1988, Ser. No. 274,172

The portion of the term of this patent subsequent to Jan. 3, 2006, has been disclaimed.

Int. Cl.[5] A61R *9/24*

U.S. Cl. 424—473 17 Claims



1. A drug-delivery device for the controlled release of an HMG-CoA reductase inhibitor salt into an environment of use which comprises:

(A) a core composition comprising

(1) a water insoluble, non-diffusible, charged resin entity, and

(2) a diffusible, water soluble, ionizable HMG-CoA reductase inhibitor salt carrying the same charge as said resin entity; and

(B) an imperforate water insoluble wall surrounding said core composition and prepared from a semipermeable material substantially impermeable to core composition and permeable to the passage of an external fluid in the environment of use, with said wall having a means for release of the therapeutic agent through the water insoluble wall; or

(C) a water insoluble wall surrounding said core composition and prepared from (1) a polymer material that is permeable to water but substantially impermeable to solute and (2) 0.1 to 75% by weight, based on the total weight of (1) and (2), of at least one water leachable pore forming additive dispersed throughout said wall.

4,976,968

ANHYDROUS DELIVERY SYSTEMS FOR PHARMACOLOGICAL AGENTS

Solomon S. Steiner, Mt. Kisco, N.Y., assignor to Clinical Technologies Associates, Inc., Elmsford, N.Y.

Filed Feb. 24, 1989, Ser. No. 315,440

Int. Cl.[5] A61K *9/50*

U.S. Cl. 424—491 20 Claims

1. Composition comprising a substantially anhydrous biologically active pharmacological agent encapsulated within hollow proteinoid microspheres formed from thermal condensation polymers of mixed amino acids.

4,976,969

OPHTHALMIC SOLUTION COMPRISING IODINE-POLYVINYLPYRROLIDONE COMPLEX

Marc Plamondon, 1325, Ave des Gouverneurs, Sillery, Quebec, Canada G1T 2G4

Filed Nov. 9, 1988, Ser. No. 269,224

Claims priority, application Canada, Nov. 10, 1987, 551522

Int. Cl.[5] A61K *33/18, 31/79*

U.S. Cl. 424—672 1 Claim

1. A method for treating allergic follicular conjunctivitis, giant papillary conjunctivitis, vernal conjunctivitis, kerato conjunctivitis sicca, and ocular dryness, which comprises administering a therapeutically effective amount of an ophtalmic solution which comprises about 0.4 to 0.9% of povidone iodine in association with a pharmaceutically acceptable ophtalmic carrier selected from the group consisting of hydroxyethyl cellulose, methylcellulose and polyvinylalcohol.

4,976,970

PHARMACEUTICAL COMPOSITION AND METHOD FOR TREATMENT OF DIGESTIVE DISORDERS

Wady N. Landy, Taine No. 223, Polanco Mexico, D.F., 11570, Mexico

Filed Feb. 24, 1989, Ser. No. 315,339

Int. Cl.[5] A61K *33/04, 35/78*

U.S. Cl. 424—705 11 Claims

1. A pharmaceutical composition for the treatment of digestive disorders which comprises: 37.5% by weight of sulphur sublimate or flower of sulphur; 50% by weight of tar and 12.5% by weight of clofibrate, wherein said percentages are based on the total weight of said composition.

4,976,971

ZEOLITES IN POULTRY NUTRITION

Sebastian M. Laurent, Greenwell Springs, and Robert N. Sanders, Baton Rouge, both of La., assignors to Ethyl Corporation, Richmond, Va.

Continuation-in-part of Ser. No. 145,232, Jan. 19, 1988, abandoned, Ser. No. 82,256, Aug. 6, 1987, Pat. No. 4,820,526, Ser. No. 42,987, Apr. 27, 1987, abandoned, and Ser. No. 934,461, Nov. 24, 1986, abandoned, said Ser. No. 145,232, is a continuation-in-part of Ser. No. 42,987, Apr. 27, 1987, abandoned, which is a continuation of Ser. No. 846,188, Mar. 3, 1986, abandoned, which is a continuation of Ser. No. 741,572, Jun. 5, 1985, abandoned, which is a division of Ser. No. 475,370, Mar. 14, 1983, Pat. No. 4,556,564, said Ser. No. 82,256, is a continuation-in-part of Ser. No. 934,457, Nov. 24, 1986, Pat. No. 4,759,932, Ser. No. 934,460, Nov. 24, 1986, abandoned, Ser. No. 934,458, Nov. 24, 1986, abandoned, and Ser. No. 934,461, Nov. 24, 1986, abandoned, each is a continuation-in-part of Ser. No. 846,188, Mar. 3, 1986, abandoned. This application Oct. 24, 1988, Ser. No. 261,113

Int. Cl.[5] A23K *1/00*

U.S. Cl. 426—2 12 Claims

1. A process for reducing the rate of internal egg quality degradation as expressed in terms of Haugh units which comprises feeding a laying poultry hen a diet which contains from about 0.25 to about 3.0 weight percent of zeolite A so that the rate in decrease in Haugh unit value of the eggs from said hen is significantly reduced as compared to the rate of such decrease under the same conditions with the same diet absent the zeolite A.

4,976,972

CHEWING GUM WITH IMPROVED SWEETNESS EMPLOYING XYLITOL ROLLING COMPOUND

Mansukh M. Patel, Downers Grove; Paul R. Chisari, Chicago, and Kevin B. Broderick, Berwyn, all of Ill., assignors to Wm. Wrigley Jr. Company, Chicago, Ill.

Continuation of Ser. No. 159,870, Feb. 24, 1988, abandoned. This application Sep. 28, 1989, Ser. No. 414,579

Int. Cl.[5] A23G *3/30*

U.S. Cl. 426—3 28 Claims

1. A sheeted chewing gum product in stick or tab form, having a core portion comprising chewable gum base, sweetener and flavoring, and further having deposited on the surface of said the core portion, a powdered rolling compound containing at least 80 percent of xylitol, said rolling compound comprising from about 0.5 to about 7 percent by weight of the chewing gum product.

4,976,973

PROCESS FOR PRODUCING PROTEIN-RICH FISH MEAL AND FISH OIL

Yoichi Shirakawa, Urawa; Yoshio Minowa, Ryugasaki; Takayoshi Azumi, Ohmiya, and Junichi Hisano, Urawa, all of Japan, assignors to Asahi Denka Kogyo K.K., Tokyo, Japan

Filed Sep. 28, 1990, Ser. No. 207,270

Claims priority, application Japan, Jul. 27, 1987, 62-187264; Jul. 27, 1987, 62-187265; Jul. 27, 1987, 62-187266

Int. Cl.[5] A23J *1/04;* A23L *1/325*

U.S. Cl. 426—7 10 Claims

1. A process for producing fish meal, which comprises: in a reactor, at a temperature of from 30 to 80° C., stirring a protease with raw fish bodies or pieces thereof, under conditions effective to remove fish meat from fish bones and form a slurry of solid, fish particles dispersed in a liquid; removing the liquid from the solid, fish particles in a continuous, three-phase decanter so as separately to obtain a first cake of solid, fish particles, a heavier liquid phase and a light liquid phase; and then drying said first cake to obtain a fish meal.

4,976,974

GRAPE JUICE CONCENTRATE AND DRINK

Hermann Thumm, Lyndoch, Australia, assignor to Chateau Yaldara PTY. Ltd., Lyndoch, Australia

Filed Jun. 2, 1988, Ser. No. 201,782

Int. Cl.[5] A23L *2/02, 2/26, 2/08;* C12G *1/02*

U.S. Cl. 426—14 9 Claims

1. A method of producing a grape juice concentrate and grape juice drink, comprising:

(a) crushing grapes, and separating grape juice from pulp;

(b) transferring the grape juice in an unfermented state to a vacuum concentrating column, heating the grape juice, subjecting the heated grape juice in the concentrating column to a sufficiently low pressure to separate it into a distillate and a grape juice concentrate having a Baume of above 25, the distillate containing water and aromatics;

(c) storing both the concentrate and distillate in separate containers;

(d) mixing some of the concentrate with the distillate to produce a low calorie grape juice drink having a Baume of between 4 and 8;

(e) further concentrating at least some of the remaining concentrate to a Baume exceeding 35; and

(f) fermenting the further concentrate from its Baume exceeding 35 to a Baume of less than 25.

4,976,975

NOVEL MICROORGANISM AND USE THEREOF IN RIPENING CHEESE

Tadgh Callanain, Cheshire, United Kingdom, assignor to Agricultural Genetics Company Limited, England

Filed Oct. 5, 1989, Ser. No. 416,675

Claims priority, application United Kingdom, Oct. 5, 1988, 8823429

Int. Cl.[5] A23C *19/32, 19/72*

U.S. Cl. 426—36 7 Claims

1. A method of making cheddar-style cheeses which comprises:

a. adding to milk a mixture of starter cultures which includes Lactobacillus helveticus AGC1 (NCIB 40051);

b. permitting the milk to ripen;

c. adding rennet to the ripened milk;

d. permitting the resulting milk to set and form a curd;

e. cutting the curd, stirring and heating to scald temperature;

f. separating the curd from the whey;

g. cheddaring the curd; and

h. recovering the cheeses.

4,976,976

FEED ADDITIVE FOR RUMINANTS

Takaharu Itagaki; Hiroyoshi Okada; Masao Miyake; Takaaki Kobayashi, all of Yokohama; Takahumi Tosa, Kawasaki, and Hiroyuki Satou, Yokohama, all of Japan, assignors to Mitsubishi Kasei Corporation and Ajinomoto Company, Incorporated, both of Tokyo, Japan

Continuation of Ser. No. 178,602, Apr. 7, 1988, Pat. No. 4,937,083. This application Jun. 21, 1989, Ser. No. 369,052

Int. Cl.[5] A23K *1/22*

U.S. Cl. 426—69 10 Claims

1. A feed additive for ruminants, consisting essentially of:

a core containing a carbamate of L-lysine or L-ornithine which is coated with a polymer coating agent soluble or swellable in water in an acidic region of a pH of at most 5.

4,976,977

PELLETING AGENT HAVING ENERGY VALUE

Mark S. Johnson, Wilmette; Edward Beaver, Palatine; Manojlo Jovanovic, Wheeling, all of Ill., and Domingo Chavez, Racine, Wis., assignors to Oil-Dri Corporation of America, Chicago, Ill.

Filed Apr. 10, 1989, Ser. No. 335,735

Int. Cl.[5] A23K *1/02, 1/20, 1/175*

U.S. Cl. 426—96 13 Claims

1. A particulate, free-flowing pelleting agent having energy value and comprising discrete, absorbent clay agglomerates having clay as a major constituent thereof and molasses as a minor constituent thereof; the clay agglomerates having a size less than about 600 microns and the weight ratio of clay particles to molasses being at least about 1.5:1, respectively.

4,976,978

METHOD OF MANUFACTURING A ROUNDISH FOOD PRODUCT

Günther Schubert, Reken, Fed. Rep. of Germany, assignor to Thomas J. Lipton, Inc., Englewood Cliffs, N.J.

Filed Aug. 1, 1988, Ser. No. 226,612

Claims priority, application European Pat. Off., Aug. 4, 1987, 87 201477.4; Aug. 4, 1987, 87 201478.2

Int. Cl.[5] A23P *1/14*

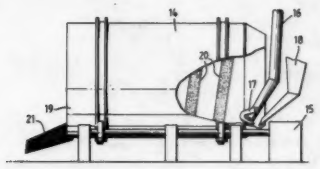
U.S. Cl. 426—295 8 Claims

1. Method for preparing a food product comprising the steps of:

extruding a plastic deformable food material into a strand;

separating said strand into pieces; and

rolling said pieces of plastic deformable food material in the presence of a particulate coating material in a revolving



drum, thereby reshaping said pieces into roundish, coated bodies.

4,976,979

PROCESS FOR THE DECAFFEINATION OF TEA

Hubertus Klima, Tacherting; Erwin Schütz, Palling, and Heinz-Rüdiger Vollbrecht, Stein/Traun, all of Fed. Rep. of Germany, assignors to SKW Trostberg Aktiengesellschaft, Trostberg, Fed. Rep. of Germany

Continuation of Ser. No. 96,757, Sep. 11, 1987, abandoned, which is a continuation of Ser. No. 858,350, May 1, 1986, abandoned. This application Mar. 20, 1989, Ser. No. 326,510

Claims priority, application Fed. Rep. of Germany, May 2, 1985, 3515740

Int. Cl.[5] A23F *3/36*

U.S. Cl. 426—427 **13 Claims**

1. A process for the selective decaffeination of tea, comprising distributing in the tea, a charcoal adsorbing means operable to remove caffeine from solution in carbon dioxide; adjusting the moisture content of the tea to 15 to 50% by weight of water; extracting the tea containing 15 to 50% by weight of water in a single step with moist carbon dioxide at 255 to 350 bar and at 50° to 80° C. in a pressure vessel thereby to extract the caffeine into the carbon dioxide and remove the caffeine from the carbon dioxide into the adsorbent; and recycling the caffeine-free carbon dioxide over the already extracted tea and separating the carbon dioxide from the tea essentially without removing flavor, color or aroma from the tea.

4,976,980

METHOD FOR THE CYCLIC PREPARATION OF A LENGTH OF CURDS AND INSTALLATION FOR CARRYING OUT THIS METHOD

Everardus G. M. Yntema, Bolsward, Netherlands, assignor to Stork Friesland B.V., Gorredijk, Netherlands

Filed Nov. 3, 1989, Ser. No. 431,579

Claims priority, application Netherlands, Nov. 4, 1988, 8802715

Int. Cl.[5] A01J *25/00*; A23C *19/00*

U.S. Cl. 426—495 **10 Claims**

1. A method for cyclic preparation of a length of curds by draining a mixture of whey and curds placed in at least one longitudinal permeable casing wherein each length of curds is produced by an entire preparation cycle that has at least a thickening phase, an extrusion phase and a discharge phase, said method comprising the steps of:

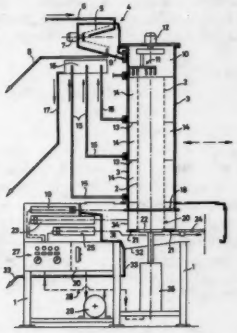
A. supplying said mixture of whey and curds to one end of said casing to form a whey-curds column inside said casing;

B. supporting said whey-curds column on a platform at the other end of said casing that is movable longitudinally of said casing toward and away from said other end;

C. moving said platform and whey-curds column away from said one end of the casing during said thickening phase while removing whey therefrom to form a thickened mass of curds in said whey-curds column at said other end of said casing;

D. extruding said thickened mass of whey-curds column from said other end of the casing during said extruding phase until a desired length of curds is achieved;

E. removing said desired length of curds during said discharge phase by causing a cutting means to pass through said whey-curds column to momentarily stop the extruding movement of said whey-curds column and cut off said



desired length of curds while leaving a cut end surface of said curds momentarily supported by said cutter means;

F. discharging said cut off desired length of curds from said platform during said discharge phase;

G. withdrawing said cutter means; and

H. moving said platform back into supporting engagement with said cut end surface.

4,976,981

METHOD FOR PREPARING PREPRESSED CHEESE CURD BLOCKS AND AN ASSEMBLY FOR CARRYING OUT SAID METHOD

Erik Skovhage, Vejle; Eskil B. Jorgensen, Silkeborg; Per G. Nielsen, Silkeborg, and Christian B. Sorensen, Silkeborg, all of Denmark, assignors to APV Pasilac A/S, Denmark

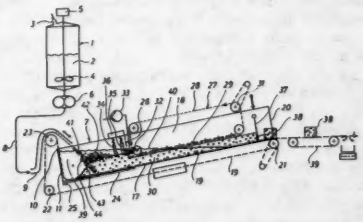
PCT No. PCT/DK88/00078, § 371 Date Nov. 9, 1989, § 102(e) Date Nov. 9, 1989, PCT Pub. No. WO88/09118, PCT Pub. Date Dec. 1, 1988

PCT Filed May 13, 1988, Ser. No. 435,406

Claims priority, application Denmark, May 18, 1987, 2508/87

Int. Cl.[5] A01J *25/00*; A23C *19/00*

U.S. Cl. 426—512 **11 Claims**



1. A method for preparing prepressed cheese curd blocks which comprises:

feeding a curd which comprises a mixture of curd grains and whey to a conveyor belt below the surface of a whey pool contained within an oblong, obliquely arranged vat; and

conveying said curd on said conveyor belt along an oblique path to a position above said surface of said whey pool while simultaneously during said conveying, collecting

curd grains, shaping said collected curd grains by pre-pressing means and side-limiting walls so as to produce a resulting cheese body, and cutting said resulting cheese body into blocks.

4,976,982

REDUCED CALORIE, HIGH FIBER PASTA

Stephen R. Gillmore, Cato, and Carleton G. Merritt, Phoenix, both of N.Y., assignors to Borden, Inc., Columbus, Ohio

Filed Aug. 11, 1989, Ser. No. 392,685

Int. Cl.[5] A23L *1/16*

U.S. Cl. 426—557 **26 Claims**

1. A method for preparing low calorie high fiber-containing pasta product comprising the steps:

(a) combining glutinous flour, a source of added fiber, a reducing agent, and water, wherein the reducing agent is present in an amount sufficient to at least essentially neutralize a sufficient amount of the oxidizing agents present in the fiber source to thereby produce improved pasta texture; and

(b) forming the product of step (a) into a desired shape;

whereby a pasta containing added fiber is produced which when cooked exhibits improved texture and color.

4,976,983

COFFEE PRODUCT WITH REDUCED MALIC ACID CONTENT

Kenneth R. Hirsh, Morganville, N.J.; Larry M. Schanbacher, Tarrytown, and Alice S. Cha, Mt. Kisco, both of N.Y., assignors to Kraft General Foods, Inc., Glenview, Ill.

Filed May 8, 1989, Ser. No. 348,627

Int. Cl.[5] A23F *5/00, 5/16*

U.S. Cl. 426—594 **26 Claims**

1. A roasted Arabica coffee product which will evoke a decreased gastric acid response upon ingestion, said coffee product having a majority of the malic acid removed therefrom and a majority of the chlorogenic acid retained therein.

4,976,984

EDIBLE OIL/FAT COMPOSITIONS

Takuji Yasukawa; Daisuke Yasumura; Kimiko Yamasawa; Yukitaka Tanaka, and Tsutomu Nishide, all of Ibaraki, Japan, assignors to Kao Corporation, Tokyo, Japan

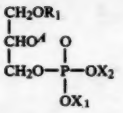
Filed Mar. 22, 1989, Ser. No. 327,343

Claims priority, application Japan, Jan. 17, 1989, 1-8151

Int. Cl.[5] A23D *7/00*

U.S. Cl. 426—602 **13 Claims**

1. An edible composition which consists essentially of an admixture of from 0.1 to 30 wt. % of a phospholipid component and from 20–99.9 wt. % of a glyceride component, said glyceride component consisting essentially of 5 to 100 percent by weight of diglycerides, based on the weight of said glyceride component, up to 10 percent by weight of monoglycerides, based on the weight of said glyceride component, and the balance is triglycerides, the ester-forming groups of said glyceride component being saturated or unsaturated aliphatic acyl groups having from 8 to 24 carbon atoms, with the provisos that at least 70 percent of said acyl groups are unsaturated acyl groups, and when the glyceride component contains monoglycerides, the weight ratio of said diglycerides to said monoglycerides is from 5/1 to 990/1, said phospholipid component having the following formula (I) in which (1) A is hydrogen or R_2, (2) R_1 and R_2 each is an aliphatic acyl group, saturated or unsaturated, having 8 to 24 carbon atoms, (3) X_1 is selected from the group consisting of base residues of choline, ethanolamine, serine, inositol, and glycerol, hydrogen, an alkali metal, an alkaline earth metal, a trivalent metal and ammonium, and (4) X_2 is selected from the group consisting of hydrogen, an alkali metal, an alkaline earth metal, a trivalent metal and ammonium, and the phospholipid component has a weight ratio of phospholipid having no nitrogen in X_1 and X_2 to phospholipid having nitrogen in X_1 and X_2 of 1.0 or more.



(I)

4,976,986

INK RECORDING MEDIUM REGENERATING METHOD

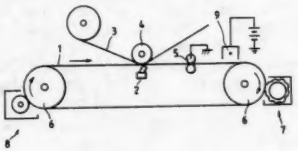
Eiichi Akutsu; Hiroh Soga, and Shigehito Ando, all of Kanagawa, Japan, assignors to Fuji Xerox Co., Ltd., Tokyo, Japan

Filed Mar. 15, 1990, Ser. No. 494,186

Claims priority, application Japan, Mar. 15, 1989, 1-60622; Mar. 15, 1989, 1-60623; Mar. 15, 1989, 1-60624

Int. Cl.[5] B05D *1/04*

U.S. Cl. 427—27 **9 Claims**



1. A method for regenerating an ink recording medium formed by successively laminating an anisotropic electrically conductive layer, a heating resistor layer for generating heat in response to application of an electric signal, an electrically conductive layer, an ink parting layer having a thickness of 0.08 to 3 μm and a volume resistivity of 10_8 Ω cm or more, and a heat-melting ink layer, in which said heat-melting ink layer after print-recording with said ink recording medium is regenerated by use of ink particles containing a binding resin and a coloring agent, said method comprising the steps of:

electrifying said heat-melting ink layer after print-recording with said ink recording medium with the same polarity as the potential of electrified ink particles; and

depositing said ink particles carried by an ink carrier on traces of transferred ink formed in said heat-melting ink layer.

4,976,987

PROCESS FOR FORMING ONE OR MORE SUBSTANTIALLY PURE LAVERS IN SUBSTRATE MATERIAL USING ION IMPLANTATION

Ronald G. Musket, San Ramon; David W. Brown, Livermore, and Zuhair A. Munir, Davis, all of Calif., assignors to The United States of America as represented by the Department of Energy, Washington, D.C.

Filed Aug. 10, 1989, Ser. No. 391,904

Int. Cl.[5] B05D *3/06, 5/12;* C23C *14/00*

U.S. Cl. 427—38 **27 Claims**

26. A process for forming a substantially pure layer of an implantable element in a substrate which comprises:

(a) selecting an implantable element and a substrate to be

implanted wherein, at the temperature to be used for the implantation and annealing:

(i) the solubilities of said implantable element and said substrate material in one another are less than 10 at. % ; and

(ii) no intermediate phases containing both said implantable element and said substrate material exist;

(b) implanting, at a temperature ranging from about −196° C. to about 10° C. below the melting point of the substrate, at least about 5×10^{16} atoms/cm^2 of said implantable element in said substrate; and

(c) annealing said implanted substrate at a temperature ranging from about 20° C. to about 10° C. below the melting point of the substrate for a period of about 1 second to about 100 hours;

to form said layer of said implantable element having a purity of at least about 90 at. % in said substrate

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4,976,988

VACUUM EVAPORATION METHOD FOR ZINC SULFIDE

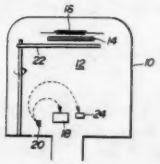
Naoki Honda, Yokosuka, Japan, assignor to Nissan Motor Co., Ltd., Yokohama, Japan

Continuation of Ser. No. 148,952, Jan. 27, 1988, abandoned. This application Apr. 17, 1990, Ser. No. 511,970

Claims priority, application Japan, Feb. 3, 1989, 62-21780

Int. Cl.[5] C23C *14/00, 14/24, 14/26, 14/30*

U.S. Cl. 427—42 **2 Claims**



1. A method for depositing a thin film of an electroluminescent phosphor on a substrate, said electroluminescent phosphor being ZnS doped with a metal element that serves as an activator, comprising the steps of:

(a) placing said substrate in a vacuum chamber and separately placing an unsintered crystalline mass of ZnS prepared by a chemical vapor deposition method, a Czochralski method, a floating zone method, or a melting zone method, or melting-solidifying method and said metal element in said vacuum chamber;

(b) heating said crystalline mass of ZnS by an electron beam in vacuum thereby evaporating said crystalline mass of ZnS whereby scattering of fine particles of the ZnS is reduced; and

(c) heating said metal element by an electron beam in vacuum so as to evaporate said metal element substantially simultaneously with the evaporation of said ZnS.

4,976,989

METHOD FOR PREPARING A MAGNETIC RECORDING MEDIUM

Masashi Aonuma; Tsutomu Okita; Hiroshi Hashimoto, and Kingo Kobayashi, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Continuation of Ser. No. 270,388, Nov. 10, 1988, abandoned, which is a continuation of Ser. No. 21,941, Mar. 5, 1987, abandoned. This application Jun. 4, 1990, Ser. No. 532,158

Claims priority, application Japan, May 5, 1986, 61-48017

Int. Cl.[5] H01F *10/02*

U.S. Cl. 427—48 **13 Claims**

1. A method for preparing a magnetic recording medium comprising the steps of:

(A) coating, on a non-magnetic, a magnetic layer mainly containing ferromagnetic particles and a binder polymerizable by radiation exposure;

(B) orienting and drying the resulting magnetic layer of step (A);

(C) conducting a calendaring treatment, at a pressure of 100 to 500 kg/cm, on the resulting oriented and dried magnetic layer of step (B); and

(D) thereafter conducting a radiation exposure treatment on the resulting calendaring magnetic layer of step (C) before winding up the magnetic layer.

4,976,990

PROCESS FOR METALLIZING NON-CONDUCTIVE SUBSTRATES

Wolf Bach, Southbury; Donald R. Ferrier, Thomaston; Peter E. Kukanskis, Woodbury; Ann S. Williams, Southbury, and Mary J. Senechal, Canton, all of Conn., assignors to MacDermid, Incorporated, Waterbury, Conn.

Filed Mar. 29, 1989, Ser. No. 331,039

Int. Cl.[5] C23C *26/00*

U.S. Cl. 427—98 **14 Claims**

1. A process for providing a full-coverage, essentially void-free, adherent metal layer on the surface of a non-conductive material, said surface consisting of the surface of a through-hole formed in a printed circuit board substrate material comprised of a glass-reinforced thermosetting or thermoplastic material, said process comprising the steps of: contacting said surface with a conditioning agent consisting essentially of an organosilane compound for a time sufficient to deposit said compound on said surface; depositing on the so-treated surface species catalytic to electroless metal deposition; and contacting said catalyzed surface with an electroless metal depositing solution to deposit metal fully and adherently and essentially void-free onto said catalyzed surface.

4,976,991

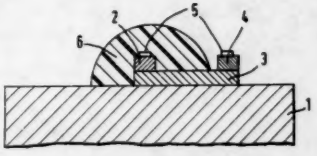
METHOD FOR MAKING A SENSOR FOR MONITORING HYDROGEN CONCENTRATIONS IN GASES

Sonya Ammende, Frankfurt am Main; Hartmut Erdmann, Steinbach; Heinz-Werner Etzkorn, Neu Anspach, and Klaus Zucholl, Mannheim, all of Fed. Rep. of Germany, assignors to Battelle-Institut e.V., Frankfurt am Main, Fed. Rep. of Germany

Division of Ser. No. 124,326, Nov. 23, 1987. This application Oct. 25, 1989, Ser. No. 426,276

Int. Cl.[5] G01N *27/47;* B05D *5/12*

U.S. Cl. 427—125 **11 Claims**



1. A method for making a sensor for monitoring hydrogen concentrations in gases, comprising the steps of:

printing a thick film solid electrolyte body comprising at least one of nasicon, titsicon, khibinskite, wadeite and β-Al_2O_3 onto a substrate;

printing a thick film detector electrode comprising one of a metal or metal oxide selected from the group consisting of platinum, platinum oxide, palladium, and palladium oxide and having a surface to be exposed to a gas to be monitored onto said solid electrolyte body;

printing a thick film reference electrode comprising sodium tungsten bronze onto said solid electrolyte body; and

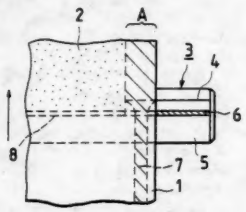
covering said reference electrode with an insulating material.

4,976,992

COATING METHOD

Naoyoshi Chino; Yasuhito Hiraki, and Tsunehiko Sato, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Oct. 4, 1989, Ser. No. 417,160
Claims priority, application Japan, Oct. 14, 1988, 63-257281
Int. Cl.[5] B05D *5/08, 5/12, 1/32*
U.S. Cl. 427—131 6 Claims



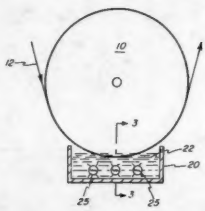
1. In a coating method in which, immediately before application of a coating solution to a running flexible belt-shaped support, a first solvent is applied to regions of said support which are not to be coated with said coating solution and are located on both sides of a coating region of said support which is to be coated with said coating solution, the improvement wherein the solubility parameter of said first solvent is different from that of a second solvent contained in said coating solution by at least 1.2 at a temperature of 25° C.

4,976,993

NON-PRESSURE DRY GLOSSING OF RESIN-COATED SHEETS AND WEB MATERIAL

Richard Sutera, Centerville, Ohio, assignor to The Mead Corporation, Dayton, Ohio

Filed Sep. 11, 1989, Ser. No. 405,159
Int. Cl.[5] B05B *5/00*; B05D *3/02*
U.S. Cl. 427—161 12 Claims



1. The method of glossing or transparentizing a resin coating surface or sheet on web material, comprising the steps of:

supplying a pool of non-wetting heated matter having a non-sticking characteristic and having a relatively high specific heat and good heat conductivity, and

applying the resin-coated surface of such material directly to said heated matter in said pool for a time sufficient to transfer heat by conduction from said matter to said surface and to coalesce the resin coating.

4,976,994

METHOD FOR MODIFYING DIFFUSION SELECTIVITY OF POROUS FRITTED CARBONACEOUS ELECTRODE

Wayne R. Matson, Ayer, Mass., assignor to ESA, Inc., Bedford, Mass.

Continuation of Ser. No. 87,166, Aug. 19, 1987, Pat. No. 4,804,455, which is a continuation of Ser. No. 797,614, Nov. 13, 1985, abandoned. This application Oct. 7, 1988, Ser. No. 254,882
The portion of the term of this patent subsequent to Feb. 14, 2006, has been disclaimed.
Int. Cl.[5] B05D *7/22*
U.S. Cl. 427—230 2 Claims

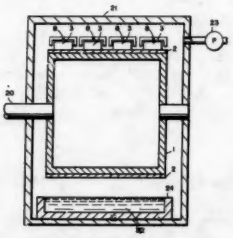
1. A method for modifying the diffusion selectivity of a porous fritted carbonaceous electrode material, said material comprising a frit of individual carbonaceous particles, having a primary porosity before between said individual carbonaceous particles and a secondary porosity within said individual carbonaceous particles comprising depositing within said secondary porosity a non-electroactive material capable of changing the energy required for charge transfer adjacent to the electrode surface.

4,976,995

CONSOLIDATION OF DEPOSITED METAL

Robert W. Gardiner, Surrey, England, assignor to The Secretary of State for Defence in Her Britannic Majesty's Government of the United Kingdom of Great Britain and Northern Ireland, London, England

PCT No. PCT/GB87/00219, § 371 Date Nov. 30, 1988, § 102(e) Date Nov. 30, 1988, PCT Pub. No. WO87/05947, PCT Pub. Date Oct. 8, 1987
PCT Filed Apr. 1, 1987, Ser. No. 282,334
Claims priority, application United Kingdom, Apr. 2, 1986, 8608023
Int. Cl.[5] C23C *16/00*
U.S. Cl. 427—251 8 Claims



1. A method for producing a metal alloy by evaporation of alloy constituents, collection of evaporated vapours upon a collector by condensation to produce a deposit of the alloy, and consolidating the deposit during the deposition process in order to avoid porosity, all being performed under vacuum, wherein said consolidation step comprises the steps of:

urging at least one roller against the surface of said deposit on said collector;

moving one of said rollers and said collector with respect to the other; and

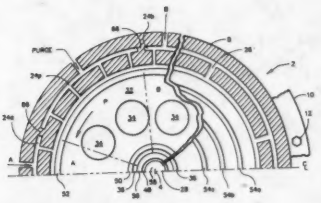
wherein said at least one roller comprises a close-packed array of narrow, independently-displaceable sub-rollers, so that each sub-roller is capable of accommodating local surface protruberances on said deposit without loss of contact pressure adjacent thereto.

4,976,996

CHEMICAL VAPOR DEPOSITION REACTOR AND METHOD OF USE THEREOF

Joseph R. Monkowski, and Mark A. Logan, both of Carlsbad, Calif., assignors to Lam Research Corporation, Fremont, Calif.

Filed Feb. 17, 1987, Ser. No. 15,359
Int. Cl.[5] C23C *16/00*
U.S. Cl. 427—255.5 **46 Claims**



1. A CVD reactor for depositing at least one layer of material onto wafer substrates, comprising:

a reaction chamber being generally circular about a central axis, said chamber having gas passages into and out of said chamber at the periphery and center thereof;

a horizontal top surface with said chamber extending substantially across said chamber, which can be held at a desired temperature and which in conjunction with a horizontal wafer support plate defines a wafer deposition zone below said top surface;

said horizontal wafer support plate for said wafer substrates disposed within said chamber below and spaced apart from said top surface, which can be held at a desired temperature and which in conjunction with said top surface defines said wafer deposition zone above said wafer support plate;

heating means to heat said wafer substrates positioned on said wafer support plate;

means for supplying said wafer deposition zone at least one reactive gas from which said layer of material is to be deposited on said wafer substrate and for exhausting excess gas and gaseous reaction products from said wafer deposition zone at the periphery and center of said reaction chamber; and

flow control means located at the periphery and center of said reaction chamber between said supplying and exhausting means and said wafer deposition zone, for passing said reactive gas radially through said wafer deposition zone and over said wafer substrates in a laminar flow and for preventing the recirculation of any reactive gas or gaseous reaction product over any wafer substrate or through any part of said reaction chamber which might affect said wafer substrate;

whereby said reactive gas passes over said wafer substrates once for a predetermined residence time.

16. A process for the deposition of at least one layer of material on a wafer substrate from a gas which comprises:

a. positioning at least one wafer substrate horizontally within a generally circular wafer deposition zone;

b. passing reactive gas radially through said zone and across the surface of said wafer substrate in a single pass and preventing the recirculation of any reactive gas or gaseous reaction product over any wafer substrate or through any part of said reaction chamber which might affect said wafer substrate;

c. heating said wafer substrate to a point at which the desired deposition material will be formed from said reactive gas by reaction on said surface of said heated wafer substrate and will subsequently bond with said surface; and

d. causing said deposition of material on said surface to be substantially uniform by maintaining said radial flow of gas at a flow rate to produce a predetermined residence time of gas over each such wafer substrate sufficiently short to prevent significant lateral diffusion or depletion of said gas across said wafer substrate.

4,976,997

SURFACE COMPOSITION FOR A SUBSTRATE AND METHOD OF PREPARATION

Elfriede Stockel, Queens Village, and Cynthia L. Buchan, Cold Spring Harbor, both of N.Y., assignors to Chemco Technologies, Inc., Glen Cove, N.Y.

Division of Ser. No. 62,713, Jun. 15, 1987, Pat. No. 4,935,463. This application May 14, 1990, Ser. No. 507,141
Int. Cl.[5] B05D *3/02*
U.S. Cl. 427—380 **8 Claims**

1. A method for generating an ink repelling, water compatible, hydrophilic, abrasion resistant surface on a lithographic plate substrate comprising:

(a) forming a dispersion comprising

(i) a crosslinkable polymer which is water soluble and an organic colloid selected from the group consisting of gelatin and polyvinyl alcohol and is crosslinkable into water insoluble form; and

(ii) a pigment component comprising clay and a pigment selected from the group consisting of anatase titanium dioxide, rutile titanium dioxide, zinc oxide and barite;

(b) adding silica to the dispersion to form a dispersion-silica mixture;

(c) applying the mixture of (b) to a lithographic substrate to form a layer;

(d) drying the layer;

(e) contacting the dried layer with a crosslinking agent having a pH of between 1.0 and 6.0 comprising

(i) a water soluble organic compound, glyoxylic acid which contains an acid and a carbonyl group;

(ii) a water soluble dicarbonyl compound selected from the group consisting of glyoxal and glutaraldehydes; and

(iii) a polymerizable resin selected from the group consisting of cellulosic film resin, melamine formaldehyde and urea formaldehyde; and

(f) drying the product of (e).

4,976,998

METHOD AND APPARATUS FOR COATING SHEAR-STAKED PERIPHERAL PORTIONS OF COATED SHELL

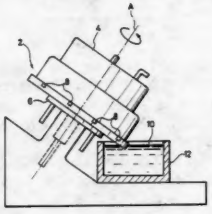
Yasumasa Morimitu, and Shinichi Yamashita, both of Higashimatsuyama, Japan, assignors to Jidosha Kiki Co., Ltd., Tokyo, Japan

Filed Mar. 10, 1989, Ser. No. 321,738
Claims priority, application Japan, Mar. 25, 1988, 63-71118
Int. Cl.[5] B05D *5/00, 1/18;* B05C *3/00*
U.S. Cl. 427—284 **5 Claims**

1. A method of coating a shear-staked peripheral portion of a substantially cylindrical coated shell, said coated shell comprising a pair of members having peripheral regions disposed in abutting relationship and being fastened together by staking them together by the application of a shearing action to the peripheral abutting regions, the method comprising the steps of: disposing a vessel containing a quantity of a coating material such that a shear-staked peripheral portion of the shell can be dipped into the coating material; positioning said shell such that it has an axis of rotation that is disposed at an angle with

respect to the horizontal but does not intersect with the vessel and said shear-staked peripheral portion is in contact with said coating material; and rotating the shell about the axis of rotation so that the coating material is deposited on the entire shear-staked peripheral portion of the shell.

2. An apparatus for coating a shear-staked portion of a substantially cylindrical coated shell which includes a pair of members disposed in abutment against each other and are then fastened together by staking them together by applying a



shearing action to the periphery of abutting regions of both members; the apparatus comprising means for holding the shell so that the axis thereof is disposed at an angle with respect to the horizontal, the holding means holding the shell from the opposite sides thereof along the axis, means for rotating the holding means about the axis of the shell, and a vessel containing a paint which is disposed so that a lowermost staked portion of the shell, which is maintained at said angle, can be dipped into the paint.

4,976,999

METHOD OF SIMULTANEOUS MULTILAYER APPLICATION

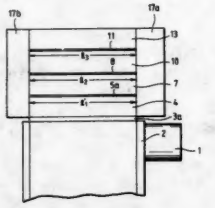
Seiji Ishizuka, Kanagawa, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Division of Ser. No. 260,226, Oct. 20, 1988. This application Aug. 24, 1989, Ser. No. 397,813

Claims priority, application Japan, Oct. 20, 1987, 62-262865; Oct. 20, 1987, 62-262866; Nov. 25, 1987, 62-295134

Int. Cl.[5] B05D *1/30*

U.S. Cl. 427—420 **1 Claim**



1. A method of simultaneous multilayer application to a continuously moving web, comprising the steps of:

continuously conveying said web around a backup roller;

simultaneously applying liquid substances as two or more mutually-overlaid layers to said continuously moving web, said liquid substance adjoining the surface of the web being water to form a lowermost layer and the other liquid substance adjoining said lowermost layer of water being a water-soluble substance having a viscosity not less than 40 cps at a shear rate of 100 sec^{-1}.

4,977,000

PAINTING METHOD

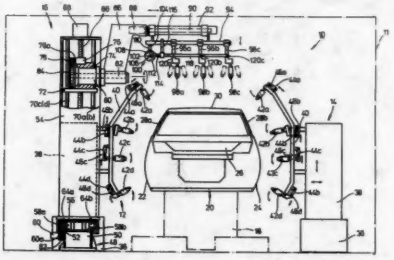
Junichi Murayama; Kazuto Iiyama; Nilchi Toyama; Katsushi Sadamitsu, and Hideki Takashima, all of Sayama, Japan, assignors to Honda Giken Kogyo Kabushiki Kaisha, Tokyo, Japan

Filed Jan. 17, 1989, Ser. No. 298,129

Claims priority, application Japan, Sep. 22, 1988, 63-239152

Int. Cl.[5] B05D *1/02*

U.S. Cl. 427—424 **6 Claims**



1. A method of painting a substantially vertical surface of an object in a coating booth in which a fluid is supplied a downward direction to forcibly lower a mist of floating paint particles, said method comprising the steps of:

positioning paint spraying means for ejecting paint sprays, perpendicularly to said vertical surface; and

displacing said paint spraying means with respect to said vertical surface in a direction against said downward direction in which said fluid is supplied, while ejecting paint sprays from said paint spraying means to coat said vertical surface.

4,977,001

PROTECTIVE CLADDING FOR A MOLYBDENUM SUBSTRATE

David C. Greenspan, Vienna, Va., assignor to Vesuvius Crucible Company, Pittsburgh, Pa.

Continuation-in-part of Ser. No. 891,847, Aug. 1, 1986, Pat. No. 4,721,533. This application Jan. 20, 1988, Ser. No. 145,947

The portion of the term of this patent subsequent to Jan. 17, 2006, has been disclaimed.

Int. Cl.[5] B65D *1/00*; B32B *15/04*

U.S. Cl. 428—34.6 **6 Claims**

1. A corrosion-resistant article comprising a molybdenum substrate having a reaction formed clad layer of a substantially amorphous composition comprising oxide-containing compounds of the elements molybdenum, aluminum, silicon and at least one alkali metal, said composition comprising said elements in about the following percentages by weight of the total metal content:

molybdenum	18–40
aluminum	10–25
silicon	25–50
alkali metal(s)	8–12.

4,977,002

SYSTEM FOR APPLYING HEAT SHRINK FILM TO CONTAINERS AND OTHER ARTICLES AND HEAT SHRINKING THE SAME

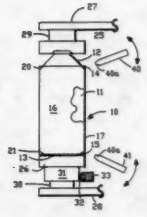
Wolfgang Hoffman, Modesto, Calif., assignor to B & H Manufacturing Company, Inc., Ceres, Calif.

Continuation of Ser. No. 89,582, Aug. 26, 1987, Pat. No. 4,844,957, which is a continuation of Ser. No. 886,192, Jul. 15, 1986, Pat. No. 4,704,173, which is a continuation of Ser. No. 601,919, Apr. 19, 1984, abandoned, which is a continuation of Ser. No. 382,374, May 27, 1982, abandoned. This application Apr. 5, 1989, Ser. No. 334,093

The portion of the term of this patent subsequent to Jul. 4, 2006, has been disclaimed.

Int. Cl.[5] B65D *23/08*

U.S. Cl. 428—34.7 15 Claims



1. An article to which a heat shrinkable film has been applied,

said article having a top extremity, a bottom extremity, a longitudinal axis between such extremities and a body portion between such extremities which has an outer surface which is parallel to such axis, said article also having at least one end portion between such body portion and an extremity of the article, such portion or portions sloping inwardly from the body portion towards the longitudinal axis,

said film being in the form of a segment of heat shrinkable but unshrunken material, said segment having a body portion constituting the major portion of the segment and having a leading end, a trailing end, an upper edge portion and a lower edge portion, said edge portions extending between the leading and trailing ends of the segment but not extending beyond the extremities of the article, said segment being wrapped around the article with its leading end secured to the body portion of the article by adhesive material confined to a narrow region of the film adjacent the leading end and with its trailing end overlapping and secured to the leading end by a narrow region of adhesive material,

at least one edge portion of the segment overlapping an end portion of the article but being unattached thereto, such edge portion or portions being free of adhesive at their leading ends

said segment being in unshrunken condition and being secured to the article entirely or substantially entirely by the adhesive material at its leading and trailing ends.

4,977,003

NONTACKY ACRYLONITRILE/BUTADIENE ADHESIVE TAPE

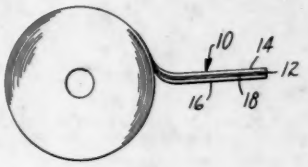
Robert C. Brown, Falcon Heights, and Shih-Lai Lu, Woodbury, both of Minn., assignors to Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Filed Feb. 20, 1985, Ser. No. 703,299

Int. Cl.[5] B32B *7/12*

U.S. Cl. 428—35.5 21 Claims

1. Adhesive tape comprising a backing and an essentially tack-free adhesive layer at least about 0.013 mm thick that consists essentially of an uncrosslinked, tackifier-free copolymer of (a) 10 to 50 weight percent of acrylonitrile and (b) 50 to 90 weight percent of at lest one of butadiene and isoprene, said copolymer having a Mooney viscosity of from about 45 to 95, and said adhesive copolymer layer having a water contact angle of at least 20°, said tape initially repositionably bonding



at room temperature directly to substrates of polyvinyl chloride, polycarbonate, polystyrene, corona-treated polyester, acrylate, vinyl chloride-vinyl acetate copolymer, or shellac, the strength of the bond increasing in a short time after application to the extent that repositionability is no longer possible.

4,977,004

BARRIER STRUCTURE FOR FOOD PACKAGES

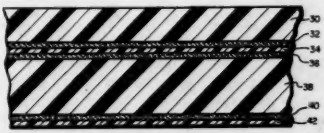
Griscom Bettle, III, Sarasota, and Christopher W. Gargano, Bradenton, both of Fla., assignors to Tropicana Products, Inc., Bradenton, Fla.

Division of Ser. No. 101,730, Sep. 28, 1987, Pat. No. 4,894,267. This application Oct. 19, 1988, Ser. No. 259,594

The portion of the term of this patent subsequent to Jan. 16, 2007, has been disclaimed.

Int. Cl.[5] B65D *65/38, 15/22;* B32B *1/02, 27/06*

U.S. Cl. 428—36.7 5 Claims



1. A package for a product, said package containing a barrier structure, said barrier structure comprising:

two layers of ethylene-vinyl alcohol copolymer;

one layer of ethylene-vinyl alcohol positioned to contact a product within said package and adapted to function to limit oil absorption;

a moisture barrier secured between said two ethylene-vinyl alcohol copolymer layers; and

a moisture barrier secured to the non-product side of the second layer of ethylene-vinyl alcohol, said second layer adapted to function as an oxygen barrier.

4,977,005

RIBBED PREFORM FOR USE IN THE BLOW MOLDING OF A PLASTIC MATERIAL CONTAINER

Suppayan M. Krishnakumar, Nashua, N.H.; Kenneth F. M. Friendship, Clarendon Hills, Ill.; Gautam K. Mahajan, Nashua, N.H., and John F. E. Pocock, Neu-Isenburg, Fed. Rep. of Germany, assignors to The Continental Group, Inc., Norwalk, Conn.

Filed Nov. 27, 1979, Ser. No. 97,603

Int. Cl.[5] B29C *49/06;* B29D *23/00*

U.S. Cl. 428—36.92 1 Claim

1. A preform for use in the blow molding of a plastic material container having an internal reinforcing rib arrangement, said preform being formed of a plastic material and including a

tubular lower portion terminating in a closed end, and an arrangement of longitudinally extending ribs integrally formed

on the inner surface of said tubular lower portion, each of said ribs being of a reduced thickness at its line of juncture with the remainder of the preform.

4,977,006

ADHESIVE LABELS AND METHODS FOR THEIR MANUFACTURE

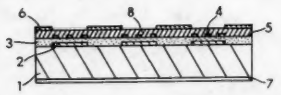
Hylton H. Smith, Prudhoe, and Richard G. Foggin, Newcastle, both of Great Britain, assignors to Revolutionary Adhesive Materials, Ltd., Gateshead, England

Filed Jul. 20, 1989, Ser. No. 383,764

Claims priority, application United Kingdom, Jul. 20, 1988, 8817239

Int. Cl.[5] B44C *00/00*; D21H *00/00*

U.S. Cl. 428—42 **32 Claims**



1. A label-dispensing structure comprising a carrier web and a face film, said carrier web having a top and reverse side, a release surface being provided on said top side, said face film having two faces, an adhesive-backing being provided on a first of said faces, the second of said faces being mounted against said release surface, wherein said release surface positively defines at least one label-shape and said face film is frangible along the contour line of said at least one label-shape, the area covered by said adhesive-backing corresponding substantially to said at least one label-shape.

25. A method for the manufacture of label-stock comprising on a carrier web having a release surface positively defining at least one label-shape, applying a face film over said at least one label-shape of said release surface, and said face film being adapted to break along the contour line of said at least one label-shape when a tractive force is applied to the area of said face film substantially corresponding to said at least one label shape.

4,977,007

SOLID ELECTROCHEMICAL ELEMENT AND PRODUCTION PROCESS THEREFOR

Shigeo Kondo, Hirakata, and Tadashi Sotomura, Kashiwara, both of Japan, assignors to Matsushita Electrical Indust. Co., Japan

Filed Sep. 8, 1987, Ser. No. 97,367

Claims priority, application Japan, Sep. 19, 1986, 61-223101; Nov. 5, 1986, 61-263408; Mar. 26, 1987, 62-72405

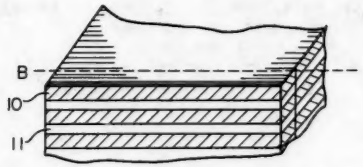
Int. Cl.[5] B32B *1/04*

U.S. Cl. 428—76 **17 Claims**

1. A solid electrochemical element which is flexible, has improved mechanical strength, and has improved stability upon exposure to the environment, comprising:

at least one solid electrolyte sheet which is flexible, has a pair of opposing surfaces, and is comprised of solid electrolyte particles and a plastic resin, which plastic resin was coated on each particle of said solid electrolyte particles prior to formation of said at least one solid electrolyte sheet; and

at least two electrode sheets comprised of an electrode material, one of said at least two electrode sheets being joined to each of said pair of opposing surfaces of said at least one solid electrolyte sheet,



wherein the at least one solid electrolyte sheet has a thickness and the solid electrolyte particles have a particle diameter which does not exceed the thickness of the at least one solid electrolyte sheet.

4,977,008

AMORPHOUS COPOLYMERS OF PERFLUORO-2,2-DIMETHYL-1,3-DIOXOLE

Edward N. Squire, Glen Mills, Pa., assignor to E. I Du Pont de Nemours and Company, Wilmington, Del.

Division of Ser. No. 361,412, Jun. 5, 1989, which is a continuation-in-part of Ser. No. 148,579, Jan. 26, 1988, abandoned, which is a division of Ser. No. 904,095, Sep. 4, 1986, Pat. No. 4,754,009, which is a continuation-in-part of Ser. No. 723,649, Apr. 16, 1985, abandoned, which is a division of Ser. No. 591,486, Mar. 20, 1984, Pat. No. 4,530,569, which is a continuation-in-part of Ser. No. 294789, Aug. 21, 1981, abandoned. This application Mar. 29, 1990, Ser. No. 501,117

Int. Cl.[5] B29D *22/00, 23/00*

U.S. Cl. 428—35.7 **4 Claims**

1. An article for handling or processing of fluids selected from the group consisting of pipes, tubings, fittings, pump housings, pump impellers, valve bodies, valve stems, valve seals, diaphragms, tanks, trays, pipettes, and laboratory vessels, wherein at least one of the surfaces coming in contact with fluids is made of an amorphous copolymer of 58–99 mole % of perfluoro-2,2-dimethyl-1,3-dioxole with complementary amounts of more than one comonomer selected from the class consisting of the following compounds:

(a) tetrafluoroethylene,
(b) chlorotrifluoroethylene,
(c) vinylidene fluoride,
(d) hexafluoropropylene,
(e) trifluoroethylene,
(f) perfluoro(alkyl vinyl ethers) of the formula CF2=CFORF, where RF is a normal perfluoroalkyl radical having 1–3 carbon atoms,
(g) fluorovinyl ethers of the formula CF2=CFOQZ, where Q is a perfluorinated alkylene radical containing 0–4 ether oxygen atoms, wherein the sum of the C and O atoms in Q is 2 to 10; and Z is a group selected from the class consisting of —COOR, —SO2F, —CH, —COF, and —OCH3, where R is a C1–C4 alkyl,
(h) vinyl fluoride, and
(i) perfluoroalkyl)ethylene, RfCH=CH2, wherein Rf is a C1–C8 normal perfluoroalkyl radical;

the glass transition temperature of the copolymer being at least 140° C.;

the maximum mole percentage, Ma . . . Mi, of each comonomer in the copolymers being as follows:

(a) for tetrafluoroethylene, Ma=35,
(b) for chlorotrifluoroethylene, Mb=42,
(c) for vinylidene fluoride, Mc=20,
(d) for hexafluoropropylene, Md=15

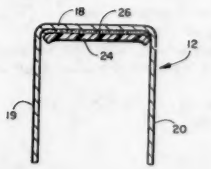
(e) for trifluoroethylene, Me=30
(f) for CF2=CFORF, Mf=30,
(g) for CF2=CFOQZ, Mg=20,
(h) for vinyl fluoride, Mh=25, and
(i) for RfCH=CH2, Mi=10;
and the amount of each comonomer other than perfluorodimethyl-1,3-dioxide being such that the sum, S, of the ratios of their mole percentage, ma . . . mi, to the maximum percentage of all such comonomers taken together, 42 mole %, is no larger than 1, as shown below:

$$S=ma/42+mb/42+\ldots+mi/42\leq 1.$$

4,977,009
COMPOSITE POLYMER/DESICCANT COATINGS FOR IC ENCAPSULATION
James E. Anderson, Ann Arbor; Vlado Markovac, Lathrup Village, both of Mich., and Philip R. Troyk, Morton Grove, Ill., assignors to Ford Motor Company, Dearborn, Mich.
Division of Ser. No. 133,820, Dec. 16, 1987, Pat. No. 4,939,014.
This application Mar. 6, 1990, Ser. No. 489,159
Int. Cl.[5] B32B *1/04*
U.S. Cl. 429—76 9 Claims

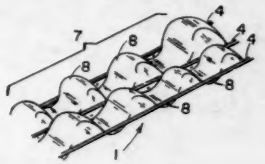
1. A composite coating for maintaining low moisture levels at the surface of solid substrates, which composite coating comprises:
a substantially continuous first layer comprising first elastomeric polymer on said substrate, said first elastomeric polymer being substantially non-reactive with said substrate and being present in a thickness of at least about 0.1 millimeter;
a substantially continuous second layer, on said first layer, comprising a mixture of desiccant and second elastomeric polymer having low permeability to water.

4,977,010
STRIPS OF CAME AND METHOD FOR PRODUCING THE SAME
John G. Washa, 5767 Vinley Pl., San Diego, Calif. 92120
Filed Nov. 18, 1988, Ser. No. 272,918
Int. Cl.[5] B32B *3/02, 15/08*
U.S. Cl. 428—83 2 Claims



1. Improved strips of came comprising:
an elongated strip of came having a U-shaped cross section having a top wall and laterally spaced downwardly extending side walls, said top wall having an inside surface;
an elongated strip of resilient cushion layer having an adhesive coating on its top surface and this top surface is pressed into mating contact with the inside surface of said strip of came;
said strip of resilient cushion layer is made of neoprene material and it has a 6:1 compression ratio; and
said strip of resilient layerr is substantially 1/32 inch thick.

4,977,011
DISPOSABLE ELASTIC STRUCTURE
Carol L. Smith, Federal Way, Wash., assignor to Weyerhaeuser Company, Tacoma, Wash.
Filed Sep. 19, 1988, Ser. No. 245,492
Int. Cl.[5] B32B *3/28*
U.S. Cl. 428—152 20 Claims



1. A breathable elastic structure comprising;
(a) a nonwoven low basis weight first outside breathable layer,
(b) a nonwoven low basis weight second outside breathable layer parallel to the first outside breathable layer,
(c) at least one elastic layer having a multiplicity of elastic strands positioned between the first breathable outside layer and the second breathable outside layer,
(d) at least one adhesive layer bonding the elastic layer and the first outside breathable layer and the second outside breathable layer to form a substantially unitary structure, and
(e) at least one of the layers is configured to introduce into a surface of the elastic structure a controlled irregularity of pleating.

4,977,012
CERAMIC WIRING SUBSTRATE BLANK MATERIAL AND PROCESS FOR PRODUCTION THEREOF
Eizo Ishikawa, Ibaraki, Japan, assignor to Mitsui Kinzoku Kogyo Kabushiki Kaisha, Tokyo, Japan
Filed Mar. 4, 1988, Ser. No. 164,339
Claims priority, application Japan, Apr. 10, 1987, 62-88490
Int. Cl.[5] B32B *15/08, 15/16, 19/04*
U.S. Cl. 428—209 14 Claims

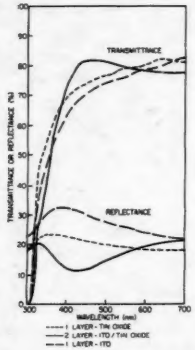
1. A ceramic wiring substrate blank material having an exposed surface conductor and comprising, in laminated state, a ceramic base, a copper foil providing said exposed surface conductor, and a bonding layer interposed between said base and said foil and containing on at least the side thereof contacting said base an inorganic filler for filling the pores of said ceramic base and providing enhanced adhesion between said copper foil and ceramic base, wherein the bonding layer comprises a primer layer and an adhesive layer respectively contacting the ceramic base and the copper foil and wherein an inorganic filler is incorporated in the primer layer.

4,977,013

TRANPARENT CONDUCTIVE COATINGS

Ian T. Ritchie, Los Angeles, and Wilfred C. Kittler, Thousand Oaks, both of Calif., assignors to Andus Corporation, Canoga Park, Calif.

Filed Jun. 3, 1988, Ser. No. 202,763
U.S. Cl. 428—212 47 Claims



1. An article having a transparent conductive coating having predetermined interference reflectance and transmission properties substantially independent of its conductivity, comprising:

(a) a substrate having a refractive index n_0 and

(b) a coating disposed over at least a portion of said substrate and consisting of:

(i) at least one transparent dielectric layer having a refractive index n_1 different from n_0; and

(ii) at least one transparent conductive layer having a refractive index substantially equal to n_1, at least one of which has a thickness sufficient to provide a desired conductivity;

said coating having a thickness such that said coating has predetermined interference reflectance and transmission properties substantially independent of the conductivity of said coating.

4,977,014

THERMOPLASTIC BLOCK COPOLYMER FILMS

Neil F. Mitchell, Santa Barbara, Calif., and Lie K. Djiauw, Houston, Tex., assignors to Shell Oil Company, Houston, Tex.

Filed Aug. 22, 1989, Ser. No. 397,072
Int. Cl.[5] C08J 5/18; C08L 53/02, 31/04, 25/06
U.S. Cl. 428—220 11 Claims

1. A polymer film having a thickness of between about 0.5 mils and 10 mils, made from a polymer blend composition having a melt index of less than 12 as determined by ASTM method 1238, condition E comprising:

about 40% to about 80% of a thermoplastic block copolymer of a monoalkenylarene and an unsaturated butadiene, containing up to about one-third porocessing oil by weight;

about 15% to about 40% of an ethylene/vinyl acetate copolymer having a vinyl acetate content between 12% and 33%; and

10 to 45 parts polystyrene per hundred parts of the block copolymer.

4,977,015

FILMS AND TAPES

Colin A. Dewar, Hucclecote, and Kevin J. Artus, Barnwood, both of United Kingdom, assignors to Imperial Chemical Industries PLC, London, England

Division of Ser. No. 167,160, Mar. 11, 1988, Pat. No. 4,919,996.
This application Dec. 22, 1989, Ser. No. 454,910
Claims priority, application United Kingdom, Mar. 17, 1987, 8706274
Int. Cl.[5] B32B 3/00
U.S. Cl. 428—221 2 Claims

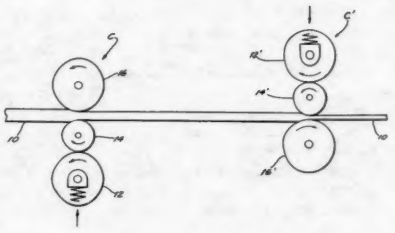
1. A self supporting melt spun film or tape of a fibre-forming polymer comprising spaced fibrils of the polymer which are substantially aligned to the longitudinal axis of the film or tape, such aligned, spaced fibrils being interconnected to each other in a random manner.

4,977,016

LOW PERMEABILITY FABRIC

Peter B. Thornton, Bronxville; Stanley H. Cone, and George W. Booz, both of Hornell, all of N.Y., assignors to Stern & Stern Industries, Inc., New York, N.Y.

Filed Oct. 28, 1988, Ser. No. 264,158
Int. Cl.[5] D03D 3/00
U.S. Cl. 428—225 13 Claims



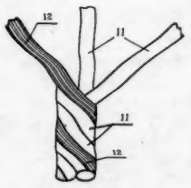
1. A strong, lightweight, thin, flexible fabric of low permeability comprising an uncoated woven cloth characterized by a permeability of not more than one cubic foot of air .per minute per square foot of cloth (0.5 $cm^3/sec/cm^2$) at a pressure drop of 0.5 inch of water (1.27 cm) across the cloth.

4,977,017

TAPE FOR TECHNICAL USE

Manfred Schneider, Herbrechtingen, Fed. Rep. of Germany, assignor to Max Schlatterer GmbH & Co. KG, Herbrechtingen, Fed. Rep. of Germany

Filed Dec. 9, 1988, Ser. No. 282,030
Claims priority, application Fed. Rep. of Germany, Dec. 12, 1987, 3742183
Int. Cl.[5] D03D 15/00, 15/12, 25/00
U.S. Cl. 428—229 8 Claims



1. In a woven tape comprising a helically wound warp thread and a plurality of weft threads;
the improvement wherein:

said warp thread comprises at least one first strand and at least one second strand twisted together;

said at least one first strand substantially consisting of linen fibers; and

said at least one second strand substantially consisting of aramid fibers.

4,977,018

SEALING ELEMENT

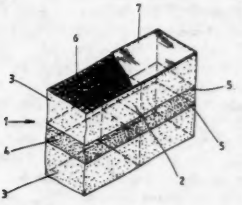
Fritz Irrgeher, Leverkusen-Hitdorf, and Frank Schwarze, Cologne, both of Fed. Rep. of Germany, assignors to Irbit Research & Consulting AG, Fribourg, Switzerland

Filed Nov. 23, 1988, Ser. No. 275,448

Claims priority, application Fed. Rep. of Germany, Nov. 23, 1987, 8715499; Nov. 25, 1987, 8715614

Int. Cl.[5] B32B *3/26*

U.S. Cl. 428—314.4 5 Claims



1. A sealing element comprising

a first part of foam and a second part of foam; and wherein the foam of the first part is made as an impregnated open-celled foam, impregnated with material having an adhesive action, having an elastically resilient volume with a property of delayed resilience, the foam of the second part being a closed cell foam having an elastically resilient volume.

4,977,019

MAGNETOOPTICAL RECORDING MEDIUM BONDED WITH A FLEXIBLE FOAM ADHESIVE

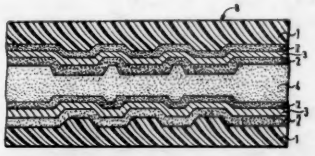
Eckhard Schaefer, Hofheim-Langenhain, Fed. Rep. of Germany, assignor to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Apr. 14, 1989, Ser. No. 337,838

Claims priority, application Fed. Rep. of Germany, Apr. 20, 1988, 3813171

Int. Cl.[5] B32B *7/12*

U.S. Cl. 428—317.5 9 Claims



1. An information recording element comprising:

two composites, each composite comprising a substrate having a magnetooptical recording layer sandwiched between dielectric layers thereon; and

a flexible adhesive foam layer hermetically bonding the entire surface of one of the composites to the other composite,

wherein the foam layer is thermally stable from about −40° C. to +150° C. and is resistant to plasticizers and solvents and wherein the magnetooptical recording layers face inwardly.

4,977,020

TRANSFER MATERIAL FOR USE WITH PRINTER

Shigeo Utsumi, Yamato, Japan, assignor to Diafoil Company, Ltd., Tokyo, Japan

Filed Aug. 25, 1989, Ser. No. 398,396

Claims priority, application Japan, Aug. 31, 1988, 63-216762

Int. Cl.[5] B41M *5/26*

U.S. Cl. 428—323 6 Claims

1. A transfer material for use with a printer, which comprises a biaxially oriented polyethylene terephthalate film which simultaneously satisfies the following expressions (I) to (III):

$$12.0 \leqq F_5 \leqq 17.0 \quad \text{(I)}$$

$$\sigma \leqq 0.06 \times F_5 - 0.5 \quad \text{(II)}$$

$$E_p \geqq 4 \times 10^3 \times \Delta n_p + 250 \quad \text{(III)}$$

wherein F_5 represents the F_5 value (kg/mm^2) in the machine direction of said polyester film, σ represents a heat shrinkage (%) in the machine direction of said polyester film after heat treatment at 100° C. for 30 minutes, E_p represents a Young's modulus (kg/mm^2) in the machine direction, and n_p represents a degree of plane orientation of said polyester film and is defined by the expression (IV):

$$\Delta n_p = n_{MD} - \frac{n_{TD} + n_\alpha}{2}$$

wherein n_{MD}, n_{TD}, and $n\alpha$ represent the refractive index in the machine direction of the film, the refractive index in the transverse direction of the film, and the refractive index in the thickness of the film, respectively, and a transfer ink layer formed on one surface or both surfaces of said polyester film.

4,977,021

METHODS FOR FORMING MAGNETIC COATINGS USING TRIOXANE RECORDING MEDIA HAVING SUCH COATINGS

Jan W. Gooch, Atlanta, Ga., assignor to Hoechst Celanese Corporation, Somerville, N.J.

Filed Aug. 5, 1988, Ser. No. 228,569

Int. Cl.[5] G11B *23/00*

U.S. Cl. 428—329 32 Claims

1. A method of forming magnetic recording medium comprising applying, onto a surface of a nonmagnetic substrate, a liquid dispersion comprised of a binder resin, a solvent for the binder resin, and a magnetic-recording effective amount of magnetic particles dispersed in the binder resin and solvent, and then curing the applied liquid dispersion so as to form a layer of the magnetic particles dispersed in a matrix of cured binder resin, and wherein the solvent for the binder includes trioxane.

4,977,022

BARRIER STRETCH FILM

Walter B. Mueller, Inman, S.C., assignor to W. R. Grace & Co.-Conn., Duncan, S.C.

Division of Ser. No. 224,842, Jul. 26, 1988, Pat. No. 4,939,076, which is a continuation-in-part of Ser. No. 168,290, Mar. 15, 1988, abandoned. This application Mar. 2, 1990, Ser. No. 488,570

Int. Cl.[5] B32B *7/12*

U.S. Cl. 428—349 7 Claims

1. A composite having a barrier stretch film comprising

(a) an outer layer comprising a heat sealable polymeric material;

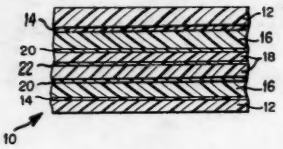
(b) a first interior layer comprising an oxygen barrier polymeric material;

(c) a second interior layer comprising a high molecular weight polymeric material;

(d) an inner layer comprising a copolyamide, and

(e) a polymeric adhesive disposed between the second interior and inner layers;

wherein said film is a lay-flat tubular film having its interior lay-flat surfaces self-welded and further comprising a second film, bonded to one surface of said barrier stretch film, comprising a polymeric material selected from the group consisting of:



(a) oriented polyester,

(b) oriented nylon,

(c) a multilayer film having an outer layer of propylene homopolymer or copolymer and an inner bonding layer of ethylene vinyl acetate copolymer, and

(d) a biaxially oriented stretch film having exterior and core layers of ethylene vinyl acetate copolymer, and two intermediate layers of linear low density polyethylene.

4,977,023

ELASTIC CARBON FIBERS

Stephen P. Krupp, Houston, Tex., and Scott L. Gessner, Greenville, S.C., assignors to The Dow Chemical Company, Midland, Mich.

Division of Ser. No. 907,931, Sep. 16, 1986, and a continuation-in-part of Ser. No. 700,231, Feb. 11, 1985, abandoned, and a continuation-in-part of Ser. No. 944,479, Dec. 22, 1986. This application Jul. 20, 1988, Ser. No. 221,843

Int. Cl.[5] D02G 3/00

U.S. Cl. 428—367 **17 Claims**

1. An oxidized stabilized nonmesophase pitch fiber having a diameter in the range of about 5 to 50 microns diameter, having a percent elongation to break of at least about 2 percent and sufficient to enable machine handling in an elastic range with no plastic range, said fiber also having a tensile strength of at least about 10,000 psi, a Young's modulus of at least about 0.4×10^6 psi and a surface area as low as 100 m^2/gm and up to about 600 m^2/gm.

4,977,024

MAGNESIA GRANULE COATED WITH SILICA OR FORSTERITE

Mitsuhiko Morita; Yasuhiko Toda, and Tetuo Yamamoto, all of Ube, Japan, assignors to Ube Industries, Ltd., Yamaguchi, Japan

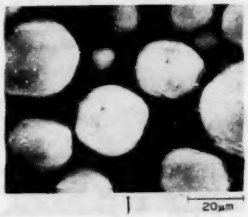
Filed Jun. 2, 1988, Ser. No. 201,766

Claims priority, application Japan, Jun. 19, 1987, 62-151053

Int. Cl.[5] B32B 18/00

U.S. Cl. 428—404 **4 Claims**

1. A heat treated magnesia granule of essentially spherical shape and of a strength suitable for use as a filler of a resin composition for sealing electronic parts, said granule having a surface covered with a continuous and uniform coating of material selected from the group consisting of silica and forsterite, and wherein the particle size distribution of said granule is such that particles of sized larger than 40 μm comprise less than 30% by weight, particles of sized of 1 to 40 μm comprises 60 to 90% by weight, and particles of sizes smaller than 1 μm comprise less than 10% by weight, and wherein said heat



treatment is conducted at a temperature in a range from 1400° C. to 1700° C. for not more than 1 hour.

4,977,025

AMORPHOUS COPOLYMERS OF PERFLUORO-2,2-DIMETHYL-1,3-DIOXOLE

Edward N. Squire, Glen Mills, Pa., assignor to E. I Du Pont de Nemours and Company, Wilmington, Del.

Division of Ser. No. 361,412, Jun. 5, 1989, Pat. No. 4,935,477, which is a continuation-in-part of Ser. No. 148,579, Jan. 26, 1988, abandoned, which is a division of Ser. No. 904,095, Sep. 4, 1986, Pat. No. 4,754,009, which is a continuation-in-part of Ser. No. 723,649, Apr. 16, 1985, abandoned, which is a division of Ser. No. 591,486, Mar. 20, 1984, Pat. No. 4,530,659, which is a continuation-in-part of Ser. No. 294,789, Aug. 21, 1981, abandoned. This application Mar. 29, 1990, Ser. No. 501,115

Int. Cl.[5] B32B 27/00

U.S. Cl. 428—421 **4 Claims**

1. A layered structure consisting essentially of at least two films or sheets thermally laminated to one another, at least one of the layers being a film or sheet of an amorphous copolymer of 58–99 mole % of perfluoro-2,2-dimethyl-1,3-dioxole with complementary amounts of more than one comonomer selected from the class consisting of the following compounds:

(a) tetrafluoroethylene,

(b) chlorotrifluoroethylene,

(c) vinylidene fluoride,

(d) hexafluoropropylene,

(e) trifluoroethylene,

(f) perfluoro(alkyl vinyl ethers) of the formula CF2=CFORF, where RF is a normal perfluoroalkyl radical having 1–3 carbon atoms,

(g) fluorovinyl ethers of the formula CF2=CFOQZ, where Q is a perfluorinated alkylene radical containing 0–4 ether oxygen atoms, wherein the sum of the C and O atoms in Q is 2 to 10; and Z is a group selected from the class consisting of —COOR, —SO2F, —CN, —COF, and —OCH3, where R is a C1–C4 alkyl,

(h) vinyl fluoride, and

(i) Perfluoroalkyl)ethylene, RfCH=CH2, where Rf is a C1–C8 perfluoroalkyl radical;

the glass transition temperature of the copolymer being at least 140° C.;

the maximum mole percentage, Ma...Mi, of each comonomer in the copolymers being as follows:

(a) for tetrafluoroethylene, Ma=35,

(b) for chlorotrifluoroethylene, Mb=42,

(c) for vinylidene fluoride, Mc=20,

(d) for hexafluoropropylene, Md=15,

(e) for trifluoroethylene, Me=30

(f) for CF2=CFORF, Mf=30,

(g) for CF2=CFOQZ, Mg=20,

(h) for vinyl fluoride, Mh=25, and

(i) for RfCH=CH2, Mi=10; and the amount of each comonomer other than perfluorodimethyl-1,3-dioxole being such that the sum, S, of the ratios of their mole percentages, ma...mi, to the maximum percentage of all such comonomers taken together, 42 mole %, is no larger than 1, as shown below:

$S=S=ma/42+mb/42+\ldots+mi/42\leq 1.$

4,977,026

AMORPHOUS COPOLYMERS OF PERFLUORO-2,2-DIMETHYL-1,3-DIOXOLE

Edward N. Squire, Glen Mills, Pa., assignor to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Division of Ser. No. 361,412, Jun. 5, 1989, Pat. No. 4,935,477, which is a continuation-in-part of Ser. No. 148,579, Jan. 26, 1988, abandoned, which is a division of Ser. No. 904,095, Sep. 4, 1986, Pat. No. 4,754,009, which is a continuation-in-part of Ser. No. 723,649, Apr. 16, 1985, abandoned, which is a division of Ser. No. 591,486, Mar. 20, 1984, Pat. No. 4,530,569, which is a continuation of Ser. No. 294,789, Aug. 21, 1981, abandoned. This application Mar. 29, 1990, Ser. No. 501,116

Int. Cl.[5] B32B 27/00

U.S. Cl. 428—422 2 Claims

1. A metallic sheet or foil having on at least one face thereof a coating of an amorphous copolymer of 58–99 mole % of perfluoro-2,2-dimethyl-1,3-dioxole with complementary amounts of more than one comonomer selected from the class consisting of the following compounds:

(a) tetrafluoroethylene,
(b) chlorotrifluoroethylene,
(c) vinylidene fluoride,
(d) hexafluoropropylene,
(e) trifluoroethylene,
(f) perfluoro(alkyl vinyl ethers) of the formula CF2=CFORF, where RF is a normal perfluoroalkyl radical having 1–3 carbon atoms,
(g) fluorovinyl ethers of the formula CF2=CFOQZ, where Q is a perfluorinated alkylene radical containing 0–4 ether oxygen atoms, wherein the sum of the C and O atoms in Q is 2 to 10; and Z is a group selected from the class consisting of —COOR, —SO2F, —CN, —COF, and —OCH3, where R is a C_1–C_4 alkyl,
(h) vinyl fluoride, and
(i) (perfluoroalkyl)ethylene, RfCH=CH2, where Rf is a C_1–C_8 normal perfluoroalkyl radical;

the glass transition temperature of the copolymer being at least 140° C.;

the maximum mole percentage, Ma . . . Mi, of each comonomer in the copolymers being as follows:

(a) for tetrafluoroethylene, Ma=35,
(b) for chlorotrifluoroethylene, Mb=42,
(c) for vinylidene fluoride, Mc=20,
(d) for hexafluoropropylene, Md=15
(e) for trifluoroethylene, Me=30
(f) for Cf2=CFORF, MF=30,
(g) for CF2=CFOQZ, Mg=20,
(h) for vinyl fluoride, Mh=25, and
(i) for RfCH=CH2, Mi=10;

and the amount of each comonomer other than perfluorodimethyl-1,3-dioxole being such that the sum, S, of the ratios of their mole percentages, ma . . . mi, to the maximum percentage of all such comonomers taken together, 42 mole %, is no larger than 1, as shown below:

$$S=ma/42+mb/42+\ldots+mi/42\leq 1.$$

4,977,027

STOPPERS FOR INJECTION AND INFUSION BOTTLES COATED WITH PLASTICS HAVING POLAR MOLECULAR GROUPS

Karl D. Schwabe, Frankfurt am Main, Fed. Rep. of Germany, assignor to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Aug. 17, 1988, Ser. No. 234,116

Claims priority, application Fed. Rep. of Germany, Aug. 19, 1987, 3727626

Int. Cl.[5] B32B 27/30; B65D 39/00

U.S. Cl. 428—423.9 9 Claims

1. A stopper for an injection or infusion bottle for a β-lactam antibiotic comprising a resilient core provided with an isolating coating of a plastic having polar molecular groups, said plastic being selected from the group consisting of cellophane, cellulose acetate, polyamide, polyester and polyurethane.

4,977,028

LAMINATED TRANSPARENT POLARIZING GLASSES AND METHOD OF MAKING

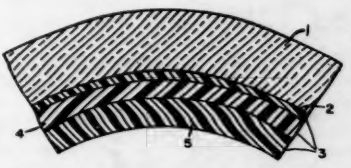
Serge P. P. Goepfert, Samoreau, and Gildas J. M. Guillevic, Perthes, both of France, assignors to Corning Incorporated, Corning, N.Y.

Division of Ser. No. 734,848, May 16, 1985, abandoned, which is a continuation of Ser. No. 446,551, Dec. 3, 1982, Pat. No. 4,865,668. This application Jun. 26, 1989, Ser. No. 371,298

Claims priority, application France, Jul. 27, 1982, 82 13076

Int. Cl.[5] B32B 17/06, 7/10, 27/40

U.S. Cl. 428—426 4 Claims



1. A laminated, transparent, polarizing glass article exhibiting a level of polarization ranging between about 90% and 50% for optical transmissions at 550 nm ranging between 25% and 45% consisting essentially of:

(a) a support of inorganic glass having parallel microgrooves in one face thereof;
(b) a coating exhibiting polarizing properties on said face of said support, said polarizing coating comprising a mixture of three organic colorants corresponding to the three primary colors and exhibiting a nematic state, the organic molecules of which are oriented to align with said parallel microgrooves;
(c) the surface of said face having a metal sulfonate diffused therein; and
(d) a continuous, optically transparent composite film consisting of a layer of thermoplastic polyurethane having adhesive properties and a layer of thermosetting polyurethane having anti-lacerating and self-healing properties, said thermoplastic polyurethane layer being adhered to said coating exhibiting polarizing properties.

4,977,029

TINTABLE COATINGS FOR GLASS OPHTHALMIC LENSES

Jacqueline L. Brown, Corning; Stephen E. Howe, Pine City, and Sheryl L. Hultman, Corning, all of N.Y., assignors to Corning Incorporated, Corning, N.Y.

Filed Jul. 5, 1988, Ser. No. 215,384
Int. Cl.[5] B32B *17/06, 9/04;* G02C *7/02, 7/10*
U.S. Cl. 428—429 3 Claims

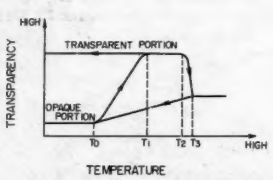
1. A glass lens having at least one coated surface, said coating having a thickness of no more than 10 microns and tinted with an organic dye operable in tinting organic plastic lenses which imparts a visible transmission to said glass lens of less than 50%, said coating being sufficiently adherent to glass to withstand boiling water and to withstand normal surface abuse and environmental stresses, and being optically clear, said coating consisting essentially of an alkyl siloxane having ester carbonyl groups present therein and containing colloidal silica and 2–10 volume % of a dipolar silane selected from the group consisting of an ester-functional silane, an amino-functional silane, a hydroxy-functional silane, a carboxylic acid-functional silane, and a halide form of those silanes.

4,977,030

REVERSIBLE THERMOSENSITIVE RECORDING MATERIALS

Yoshihiko Hotta, Numazu, and Keishi Kubo, Yokohama, both of Japan, assignors to Ricoh Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 80,432, Jul. 30, 1987, abandoned. This application May 30, 1989, Ser. No. 361,801
Claims priority, application Japan, Aug. 5, 1986, 61-182667; Oct. 22, 1986, 61-251234; Oct. 23, 1986, 61-253095; Nov. 21, 1986, 61-278102; Jan. 20, 1987, 62-9077; Jan. 21, 1987, 62-12971
Int. Cl.[5] B41M *5/26*
U.S. Cl. 428—447 20 Claims



1. A reversible thermosensitive recording material comprising a support and a thermosensitive layer whose transparency reversibly changes depending on its temperature, said layer comprising a resin matrix and an organic low molecular substance dispersed in said resin matrix, wherein as said organic low molecular substance, a higher fatty acid A having carbon atoms of 16 or more and at least one member of the following compounds (a),(b),(c),(d) and (e) are used in the weight ratio of 95:5–20:80;

(a) a higher fatty acid having carbon atoms of 10–15,

(b) a higher alcohol having carbon atoms of 12 or more,

(c) a compound represented by the general formula: R_1—X—R_2, wherein R_1 and R_2 each represents a substituted or unsubstituted alkyl group or aralkyl group having carbon atoms of 10 or more; or represents —R_3COOR_4 or —R_5-$OCOR_6$ (wherein R_3 and R_5 each represents an alkylene group having carbon atoms of 1 or more and R_4 and R_6 each represents a substituted or unsubstituted alkyl group or aralkyl group having carbon atoms of 10 or more), and X represents —O—, —NH—, —S— or —S—S— group,

(d) a compound represented by the general formula: R_{11}—$COOR_{12}$, wherein R_{11} represents an alkyl group having carbon atoms of 10 or more, and R_{12} represents an alkyl group having carbon atoms of 1 or more, and

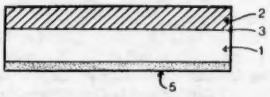
(e) a compound represented by the general formula: $C(CH_2OR_{20})_4$, wherein R_{20} represents a hydrogen atom or —COR_{21} (R_{21} represents an alkyl group having carbon atoms of 10 or more), but both should not be hydrogen simultaneously.

4,977,031

MATERIAL FOR PACKAGING A MOISTURE-SENSITIVE PRODUCT, A PROCESS FOR THE MANUFACTURE OF SUCH MATERIAL, AND PACKAGING COMPRISING SUCH MATERIAL

Robert Temple, Saint Yrieix, France, assignor to Societe Charentaise de Participations, S.A., Barbezieux, France

Filed Dec. 1, 1986, Ser. No. 938,553
Claims priority, application France, Dec. 3, 1985, 85 17879
Int. Cl.[5] B32B *15/00*
U.S. Cl. 428—463 10 Claims



1. A material, in sheet form, for the packaging of a moisture-sensitive food, such as a cheese, comprising in combination at least one support sheet and a coating of at least one water retentive material on said support sheet, said support sheet being selected from the group consisting of paper, cellulose films, regenerated pure cellulose polymers, polyethlylene, polypropylene, polyvinyl chloride and polyester; and said water-retentive material being a water-retentive resin selected from the group consisting of polyacrylonitriles or acrylonitrile-based copolymers, treated with alkaline aqueous solutions of aliphatic or cycloaliphatic mono or polyfunctional alcohols having melting points greater than or equal to 110° C. solutions of aliphatic or cycloaliphatic mono or polyfunctional alcohols of a melting point greater than or equal to 110° C.

4,977,032

COMPOSITE PVDC-COATED POLYESTER FILMS

Pierre Grosjean, Sainte Foy Les Lyon, France, assignor to Rhone-Poulenc Films, Courbevoie, France

Division of Ser. No. 146,735, Jan. 21, 1988, Pat. No. 4,868,064. This application Jul. 20, 1989, Ser. No. 382,317
Claims priority, application France, Jan. 21, 1987, 87 00823
Int. Cl.[5] B32B *27/08, 27/36;* B05D *1/36, 7/26*
U.S. Cl. 428—483 2 Claims

1. A product comprising a crystalline or semicrystalline polyester film substrate (A), said film substrate (A) having a coating (B) comprising an oxysulfonylated copolyester adhesion primer on at least one of the face surfaces thereof, and a polyvinylidene chloride topcoat (C) on said at least one primer coating (B); wherein the product is produced by the process of coextruding the crystallizable polyester film (A) with said coating (B), next orienting and thermosetting such coextrudate, and then coating such coextrudate with an aqueous latex of polyvinylidene chloride so as to obtain the product.

4,977,033

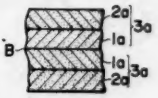
PACKAGING MATERIAL

Mutsuo Akao, Minami-Ashigara, Japan, assignor to Fuji Photo Film Co., Ltd., Minami-Ashigara, Japan

Filed Dec. 28, 1989, Ser. No. 458,290
Claims priority, application Japan, Dec. 29, 1988, 63-332034
Int. Cl.[5] B32B *27/08*
U.S. Cl. 428—516 4 Claims

1. A packaging material which comprises a coextruded multilayer inflation film of which the inner layer is a polyolefin resin film layer containing more than 3 wt. % of an ethylene-α-

olefin copolymer resin having a melt index of 0.1 to 20 g/10 minutes (ASTM D-1238), a density of 0.880 to 0.908 g/cm^3



(ASTM D-1505) and a molecular weight distribution of more than 4.0, and is adhered through pseudo-adhesion by blocking.

4,977,034

PROCESS FOR COEXTRUSION BILLETS WITH MULTIPLE METALLIC CYLINDRICAL LAYERS BY HOT ISOSTATIC PRESSING AND PRODUCT

Chun T. Wang, Salem, Oreg., assignor to Teledyne Industries, Inc., Albany, Oreg.

Filed Nov. 7, 1989, Ser. No. 432,897
Int. Cl.^{5} G22F *7/00*
U.S. Cl. 428—548 **6 Claims**

1. In a process for making an extrusion billet comprising two or more concentric cylindrical layers of zirconium or zirconium alloys with hot isostatic pressing, the improvement which comprises:

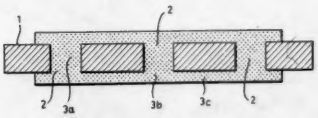
further treating the billet by hot isostatic pressing under sufficient pressure and proper temperature to form a bond between the metallic layers characterized by improved bonding strength and reduced bondline defects.

4,977,035

GETTER STRIP

Jonathan A. Travis, Oak Ridge, and Winfred L. Woodard, III, Midland Park, both of N.J., assignors to Ergenics, Inc., Ringwood, N.J.

Filed Mar. 3, 1989, Ser. No. 318,609
Int. Cl.^{5} B22F *3/10*
U.S. Cl. 428—550 **2 Claims**



1. A composite strip getter structure comprising getter powder pressed into and onto an open reticulated network carrier strip such that the getter powder particles form an agglomeration with strength deriving both from interlocking of said getter particles and from support of the getter agglomeration by the network; the getter powder selected from a group consisting of one or more of Ti, Zr, Cr, V, Nb, Ta, Ba, Th, Ca, Al, Ni, Mn, Fe and one or more rare earth elements; the getter powder composition being a physical mixture of metals in alloyed form and in intermetallic compound form.

4,977,036

COATING AND COMPOSITIONS

Alfonso L. Baldi, Sea Isle City, N.J., assignor to Alloy Surfaces Company, Inc., Wilmington, Del.

Continuation-in-part of Ser. No. 205,387, Jun. 10, 1988, Pat. No. 4,895,609, and a continuation-in-part of Ser. No. 182,718, Apr. 18, 1988, and a continuation-in-part of Ser. No. 862,712, May 13, 1986, Pat. No. 4,871,708, and a continuation-in-part of Ser. No. 830,767, Feb. 19, 1986, Pat. No. 4,799,979, and a continuation-in-part of Ser. No. 777,755, Sep. 19, 1985, abandoned, and a continuation-in-part of Ser. No. 757,606, Jul. 22, 1985, abandoned, and a continuation-in-part of Ser. No. 707,656, Mar. 4, 1985, Pat. No. 4,824,482, and a continuation-in-part of Ser. No. 685,910, Dec. 27, 1984, Pat. No. 4,820,362, and a continuation-in-part of Ser. No. 584,538, Feb. 28, 1984, Pat. No. 4,845,139, and a continuation-in-part of Ser. No. 538,541, Oct. 3, 1983, abandoned, and a continuation-in-part of Ser. No. 479,211, Mar. 28, 1983, abandoned, and a continuation-in-part of Ser. No. 632,016, Jul. 18, 1984, abandoned, and a continuation-in-part of Ser. No. 605,284, Apr. 30, 1984, abandoned, and a continuation-in-part of Ser. No. 571,510, Jan. 17, 1984, Pat. No. 4,537,927, and a continuation-in-part of Ser. No. 488,103, Apr. 25, 1983, Pat. No. 4,615,970, and a continuation-in-part of Ser. No. 417,214, Sep. 13, 1982, abandoned, and a continuation-in-part of Ser. No. 398,830, Jul. 16, 1982, Pat. No. 4,467,016, and a continuation-in-part of Ser. No. 302,979, Sep. 17, 1981, abandoned, and a continuation-in-part of Ser. No. 281,405, Jul. 8, 1981, Pat. No. 4,708,913, and a continuation-in-part of Ser. No. 230,333, Feb. 2, 1981, Pat. No. 4,347,267, and a continuation-in-part of Ser. No. 191,780, Sep. 29, 1980, abandoned, and a continuation-in-part of Ser. No. 172,671, Jul. 28, 1980, Pat. No. 4,435,481, and a continuation-in-part of Ser. No. 73,539, Sep. 7, 1979, Pat. No. 4,260,654. This application Nov. 21, 1989, Ser. No. 440,026
Int. Cl.^{5} B22F *7/04*
U.S. Cl. 428—553 **5 Claims**

1. A self-sustaining elongated carrier foil less than about 25 microns thick of metal to which is sintered at least one layer at least about 25 microns thick of pyrophoric aluminide particles.

4,977,037

SMOOTHER CONTINUOUS CAST STEEL BAR PRODUCT

George C. Ward; Thomas N. Wilson, and Uday F. Sinha, all of Carrollton, Ga., assignors to Southwire Company, Carrollton, Ga.

Continuation of Ser. No. 311,703, Oct. 15, 1981, abandoned, which is a continuation of Ser. No. 111,423, Jan. 11, 1980, abandoned, which is a division of Ser. No. 860,657, Dec. 14, 1977, abandoned. This application Feb. 21, 1986, Ser. No. 831,127
Int. Cl.^{5} B22D *11/06, 25/06*
U.S. Cl. 428—577 **30 Claims**

1. A continuously cast steel bar cast at a rate greater than 240 inches per minute, said bar having an as-cast surface roughness measurement of less than about 1000 microinches; that is, the cumulative total depth of the finer irregularities in the surface divided by the number of such surface irregularities is less than about 0.001 inches (1000 microinches) and the average depth of

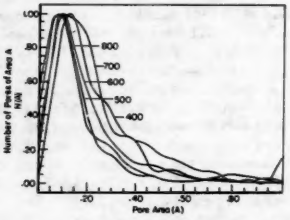
any surface flaws or other such defects in said cast steel bar is less than about 0.10 inches (100,000 microinches).

4,977,038

MICRO- AND NANO-POROUS METALLIC STRUCTURES

Karl Sieradzki, 3703 Gardenview Rd., Baltimore, Md. 21208, and Roger C. Newman, 2 Moss Lane, Alderley Edge, Cheshire, SK9 7HN, England

Filed Apr. 14, 1989, Ser. No. 338,260
Int. Cl.[5] B32B *5/18*; C25F *3/14*
U.S. Cl. 428—610 **36 Claims**



1. A process for producing micro- and nano-porous metallic structures comprising the following step:

mixing silver and gold according to predetermined proportions to form a binary alloy;

contacting said alloy with an electrolyte;

applying an electrochemical potential to said alloy wherein said alloy acts as an anode until all or a portion of the silver is dissolved from the alloy leaving porous metal; and

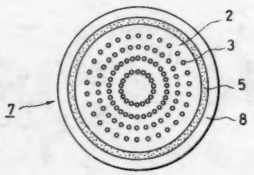
placing said porous metal into a furnace at an elevated temperature for a predetermined period of time, to anneal said porous metal.

4,977,039

SUPERCONDUCTING WIRE AND CABLE

Toshitada Onishi; Noboru Higuchi, and Itaru Ishii, all of Tsukuba, Japan, assignors to Agency of Industrial Science and Technology, Tokyo, Japan

Filed Mar. 5, 1990, Ser. No. 488,979
Claims priority, application Japan, Mar. 27, 1989, 1-74473
Int. Cl.[5] H01F *7/22*; H01B *7/34*
U.S. Cl. 428—623 **12 Claims**



1. A superconducting wire comprising:

a wire element including a metallic matrix and a plurality of superconducting filaments arranged in said metallic matrix; and

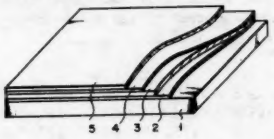
a covering layer on the surface of said metallic matrix having a laminated structure with at least one thermal insulator film as a lower layer and at least one thermal conductor film as an upper layer.

4,977,040

MAGNETIC CARD

Norio Yano, and Ginya Ishiguro, both of Yokosuka, Japan, assignors to Nippon Telegraph and Telephone Corporation, Tokyo, Japan

Continuation of Ser. No. 12,550, Feb. 19, 1987, abandoned. This application Jun. 29, 1988, Ser. No. 213,469
Claims priority, application Japan, Feb. 17, 1986, 61-33490
Int. Cl.[5] G11B *23/00*
U.S. Cl. 428—692 **13 Claims**



1. A magnetic card for storing selected information, comprising:

a substrate;

a plurality of stacked magnetic recording layers provided on the substrate, each of the magnetic recording layers having a coercive force that enables magnetic recording and in which a portion of the selected information is stored in accordance with a predetermined relationship such that said respective portions stored in the plurality of magnetic recording layers are combinable to reproduce said selected information; and

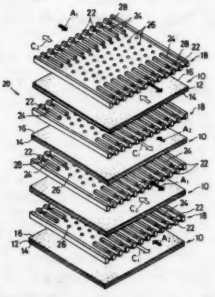
a magnetic shielding layer provided at least on the uppermost magnetic recording layer, the shielding magnetic layer having such a small coercive force as is unsuitable for magnetic recording.

4,977,041

FUEL CELL AND METHOD OF AMELIORATING TEMPERATURE DISTRIBUTION THEREOF

Shoji Shiozawa, Yokohama, and Toru Shimizu, Urawa, both of Japan, assignors to Ishikawajima-Harima Heavy Industries Co., Ltd., Tokyo, Japan

Filed Nov. 21, 1988, Ser. No. 273,888
Int. Cl.[5] H02M *8/04*
U.S. Cl. 429—26 **40 Claims**



1. A fuel cell comprising:

cell elements, each cell element including an electrolyte plate, an anode plate and a cathode plate, the electrolyte plate being sandwiched by the anode plate and the cathode plate; and

separator plates, each separator plate possessing passages formed on the front and back faces thereof so as to supply fuel gas to the anode plate of a cell element and to supply

gaseous oxidizer to the cathode plate of an adjacent cell element,

the cell elements and the separator plates being piled up one after the other, creating plural stages,

characterized in that said fuel cell further comprises:

anode side gas supply means for supplying the fuel gas to fuel gas passages formed on one face of the separator plate;

cathode side gas supply means for supplying the gaseous oxidizer to the oxidizer passages formed on the other face of the separator plate in a manner such that the oxidizer gas supplied to one separator plate may flow in the direction opposite to the oxidizer gas supplied to adjacent separator; and

heat transfer assisting means formed on the front and back faces of each separator plate so as to assist heat transfer in the direction the separator plates and the cell elements are piled up.

4,977,042

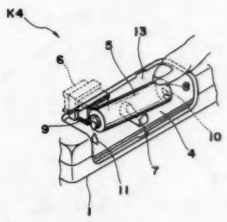
RECHARGEABLE TYPE SMALL ELECTRIC APPLIANCE

Masanobu Chiyajo; Toshio Kuroki, both of Fukuoka, and Eiji Sakata, Tagawa, all of Japan, assignors to Kyushu Hitachi Maxell, Ltd., Tagawa, Japan

Filed Dec. 6, 1989, Ser. No. 446,762

Int. Cl.[5] H01M 2/02

U.S. Cl. 429—49 **15 Claims**



1. A rechargeable type small electric appliance including a rechargeable battery having negative and positive terminals, said negative and positive terminals being, respectively, connected to a wiring board by a pair of lead members,

wherein at least one of said lead members is bent in an inverse U-shape so as to have first and second pieces and a bent portion connecting said first and second pieces,

said first piece being secured to said wiring board, while said second piece is clamped, at a clamp portion thereof, to a corresponding one of said negative and positive terminals,

said bent portion projecting outwardly beyond said clamp portion of said second piece in a radial direction of said rechargeable battery.

4,977,043

RECTANGULAR SEALED ALKALINE STORAGE BATTERY WITH NEGATIVE ELECTRODE COMPRISING HYDROGEN STORAGE ALLOY

Eiji Kadouchi, Hirakata; Isao Matsumoto, Osaka; Takabumi Fujii, Suita; Hiroshi Sato, Uji, and Takashi Hino, Hirakata, all of Japan, assignors to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

Filed Jan. 29, 1990, Ser. No. 471,931

Claims priority, application Japan, Dec. 13, 1989, 1-323349

Int. Cl.[5] H01M 2/12, 10/34

U.S. Cl. 429—54 **74 Claims**

1. A rectangular sealed alkaline storage battery comprising a rectangular metallic case which contains electricity generation elements and is sealed by a metallic lid body provided with a safety valve wherein said electricity generation elements comprises:

(a) rectangular positive electrodes comprising an active material mainly composed of a metal oxide,

(b) rectangular negative electrodes mainly composed of a hydrogen storage alloy powder and a matrix having electroconductivity, at least a part of the surface of electrodes being imparted with hydrophobic properties,

(c) an alkaline electrolyte, and

(d) separators which electrically insulate between the positive electrode and negative electrode, have therein a proper space from the electrolyte necessary for charging and discharging reaction and are chemically stable against alkali;

both the left and right outer most sides of an electrode stack comprise the negative electrodes and directly contact the metallic case and the positive electrodes are connected, through a lead, to terminals provided, being insulated from the metallic lid body

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4,977,044

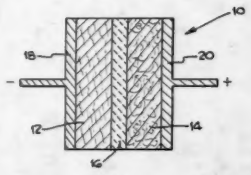
SODIUM-SULFUR THERMAL BATTERY

Frank A. Ludwig, Rancho Palos Verdes, Calif., assignor to Hughes Aircraft Company, Los Angeles, Calif.

Filed Oct. 3, 1989, Ser. No. 416,686

Int. Cl.[5] H01M 4/36, 2/14

U.S. Cl. 429—104 **16 Claims**



1. A sodium-sulfur thermal battery for generating electrical energy at temperatures above the melting point of sodium metal and sulfur, said battery comprising:

(a) a sodium electrode comprising sodium metal;

(b) a sulfur electrode comprising sulfur; and

(c) a separator located between said sodium and sulfur electrodes, said separator having sufficient porosity to allow preliminary migration of fluid sodium metal and fluid sulfur and fluid sodium polysulfides therethrough during operation of said thermal battery to form a mixed polysulfides electrolyte gradient within said separator.

4,977,045
SOLID-STATE ELECTROLYTIC BATTERY

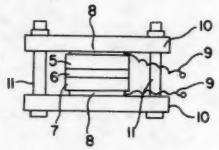
Motoo Mohri, Nara, Japan, assignor to Sharp Kabushiki Kaisha, Osaka, Japan

Continuation of Ser. No. 311,404, Feb. 15, 1989, abandoned, which is a continuation of Ser. No. 192,132, May 9, 1988, abandoned, which is a continuation of Ser. No. 922,800, Oct. 24, 1986, abandoned, which is a continuation of Ser. No. 710,371, Mar. 11, 1985, abandoned. This application Jan. 22, 1990, Ser. No. 467,998

Claims priority, application Japan, Mar. 14, 1984, 59-49674

Int. Cl.[5] H01M *6/18, 10/36*

U.S. Cl. 429—192 19 Claims



1. A completely solid-state battery, comprising:

an anode material comprised of activated titanium nickel alloy storing metallic-hydrogenated hydrogen having a first and second surface;

a manganese dioxide or titanium disulfide cathode material capable of internally accommodating hydrogen-ions as a guest material having a first and second surface; and

a solid-state electrolyte comprised of a hydrogen-ion conductive element selected from the group consisting of phosphotungstate hydrate, stannic dioxide, antimony pentaoxide, zirconium oxide, aluminosilicate, a variety of matrix materials containing proton-imparted cation and solid-state high-polymer electrolyte composed of perfluorocarbon, said solid-state electrolyte being disposed between said anode and said cathode and being in direct contact with both said first surface of said anode and said first surface of said cathode.

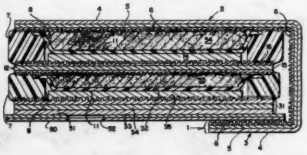
4,977,046
LITHIUM BATTERIES

Walter Bleszinski, Jr., Andover, and Alan H. Bruder, Burlington, both of Mass., assignors to Polaroid Corporation, Cambridge, Mass.

Filed Apr. 26, 1982, Ser. No. 372,158

Int. Cl.[5] H01M *6/14*

U.S. Cl. 429—194 9 Claims



1. A battery comprising a cathode slurry of manganese dioxide and carbon in a solution of a lithium salt in an organic solvent in contact with a copper substrate, and a lithium anode, said battery having an OCV below the value at which the copper substrate will be oxidized by the manganese dioxide in the presence of the lithium.

4,977,047
METHOD OF PREPARING A HOLOGRAM

Neil F. Ashford, Crewe; Alan Hodgson, Stockport; Peter M. Blum, Altrincham, and Stephen R. Postle, Sale, all of England, assignors to Ilford Limited, Cheshire, England

Filed Mar. 1, 1989, Ser. No. 317,661

Claims priority, application United Kingdom, Mar. 7, 1988, 8805398

Int. Cl.[5] G03C *00/00*

U.S. Cl. 430—2 17 Claims

1. A method of preparing a -hologram which is of the silver halide in gelatin binder type which method comprises holographically exposing the holographic material by use of coherent light, developing the holographic image by a chemical process and bleaching the developed silver wherein, after development, the material is treated with an aqueous solution of an anionic surfactant selected from the group consisting of an alkyl sulphonate, and alcohol sulphate, an ether sulphate, a phosphate ester and a sulphosuccinate to achieve bathochromic shift in the replay wavelength.

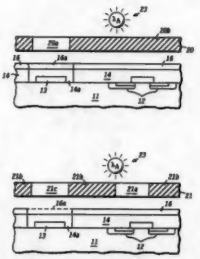
4,977,048
ACTINIC ALIGNMENT TO CEM COATED RESIST FILMS

Whitson G. Waldo, III, Chandler, Ariz., assignor to Motorola, Inc., Schaumburg, Ill.

Filed Jul. 5, 1989, Ser. No. 375,560

Int. Cl.[5] G03F *9/00*

U.S. Cl. 430—22 10 Claims



1. A method for alignment of a pattern projected onto a semiconductor wafer to an alignment target, the semiconductor wafer being coated with photoresist which is sensitive to a characteristic actinic wavelength, and the photoresist being coated with an initially opaque contrast enhancement material (CEM) which is bleachable at the actinic wavelength, the alignment target formed in a first area of the wafer and an active device formed in a second area of the wafer, the method comprising the steps of: exposing the CEM and photoresist over the first area of the wafer to light while protecting the second portion of the wafer from exposure, thereby making the CEM transparent over the alignment target; and aligning the projected pattern to the alignment target using the actinic wavelength of light.

4,977,049
ELECTROPHOTOGRAPHIC LITHOGRAPHIC PRINTING PLATE PRECURSOR

Eiichi Kato, Shizuoka, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Feb. 6, 1989, Ser. No. 306,418

Claims priority, application Japan, Feb. 4, 1988, 63-22839

Int. Cl.[5] G03G *5/087*

U.S. Cl. 430—49 14 Claims

1. An electrophotographic lithographic printing plate precursor having an electrophotographic photoreceptor which

has at least one photoconductive layer containing a photoconductive zinc oxide and a resin binder on a conductive support, wherein the resin binder contains at least one resin, which has at least one functional group capable of forming at least one group selected from the group consisting of a thiol group, a phosphono group, an amino group and a sulfo group by decomposition upon treatment with an oil-desensitizing solution or dampening water and at least a part of which resin has been crosslinked.

4,977,050

ELECTROPHOTOGRAPHIC SENSITIVE MEMBER

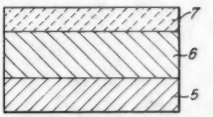
Takao Kawamura, Sakai; Naooki Miyamoto, Yohkaichi; Hiroshi Ito, Yohkaichi; Hitoshi Takemura, Yohkaichi, and Kokichi Ishibutsu, Yohkaichi, all of Japan, assignors to Kyocera Corporation, Kyoto, Japan

Filed Dec. 21, 1988, Ser. No. 288,949

Claims priority, application Japan, Dec. 28, 1987, 62-333569; Dec. 28, 1987, 62-333570; Dec. 28, 1987, 62-333571; Jan. 28, 1988, 63-18180; May 17, 1988, 63-120365; May 23, 1988, 63-125424; May 30, 1988, 63-133792; May 31, 1988, 63-133791

Int. Cl.[5] G03G *5/082, 5/14*

U.S. Cl. 430—57 **4 Claims**



1. An electrophotographic sensitive member comprising at least a photoconductive amorphous silicon layer containing at least one of hydrogen and a halogen, and a photoconductive amorphous silicon carbide layer formed on an electrically conductive substrate in layers in this order, characterized in that an atomic ratio of a silicon element to a carbon element in said amorphous silicon carbide layer is set within a range of $0.01 \leqq x \leqq 0.5$ in a value of x in $Si_{(1-x)}C_x$ and a thickness of said amorphous silicon carbide layer is set within a range of 0.05 to 5 μm and additionally said amorphous silicon carbide layer comprises a layer zone containing elements of the group IIIa or the group Va in the periodic table therein in a quantity of 0.5 to 100 ppm, and further characterized in that the content of said elements of the group IIIa or Va in the periodic table is gradually reduced from said substrate to a surface of the photosensitive member in the direction of layer thickness.

4,977,051

TRISAZO ELECTROPHOTOGRAPHIC PHOTORECEPTOR

Shigeru Ohno; Katsuji Kitatani; Naonori Makino; Satoshi Hoshi, and Hideo Sato, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

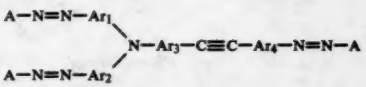
Filed Nov. 8, 1989, Ser. No. 433,247

Claims priority, application Japan, Nov. 8, 1988, 63-281848

Int. Cl.[5] G03G *5/047, 5/06*

U.S. Cl. 430—58 **17 Claims**

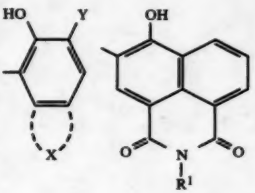
1. An electrophotographic photoreceptor comprising an electrically conductive support having thereon a layer which contains a charge carrier transporting compound and a charge carrier generating compound, or a layer which contains charge carrier transporting compound and a layer which contains a charge generating compound, wherein at least one type of tris-azo compound represented by formula (I) is included as a charge carrier generating compound:

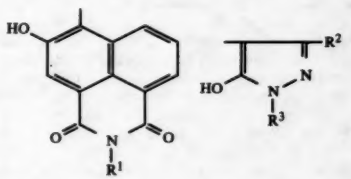


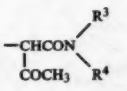
(I)

wherein Ar_1, Ar_2, Ar_3 and Ar_4, which may be the same or different, each is a divalent condensed polycyclic aromatic group or a divalent heterocyclic aromatic group, Ar_1 and Ar_2, Ar_2 and Ar_3, and Ar_3 and Ar_1 may, together with the nitrogen atom in formula (I) and a group of other atoms as required, form a ring;

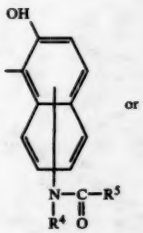
A is one of the following groups,

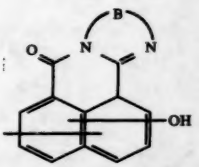






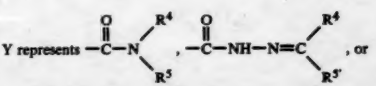
or





wherein X is a group of atoms which is required to complete an aromatic ring or a heterocyclic ring which is condensed with the benzene ring to which the hydroxyl group and the group Y are bonded in the above mentioned formula,

Y represents



-continued

R^1 represents an alkyl group or a phenyl group;

R^2 is a hydrogen atom, a lower alkyl group, a carbamoyl group, a carboxyl group, an alkoxycarbonyl group, an aryloxycarbonyl group or an amino group;

R^3 is an alkyl group, an aromatic group or a heterocyclic aromatic group;

R^4 and R^5 each is a hydrogen atom, an alkyl group, an aromatic group or a heterocyclic aromatic group, provided that R^4 and R^5 cannot both be hydrogen atoms at the same time, further provided that R^5 may not be a hydrogen atom when Y is

and

B represents a divalent aromatic hydrocarbyl group or a divalent heterocyclic ring in which a nitrogen is included.

4,977,052

ELECTRO-STATOGRAPHIC TONER MATERIAL

Takeshi Mikami, Shizuoka, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Continuation of Ser. No. 380,724, Jul. 13, 1989, abandoned, which is a continuation of Ser. No. 223,667, Jul. 25, 1988, abandoned, which is a continuation of Ser. No. 52,200, May 19, 1987, abandoned, which is a continuation of Ser. No. 794,261, Nov. 1, 1985, abandoned, which is a continuation of Ser. No. 371,219, Apr. 23, 1982, abandoned. This application Feb. 20, 1990, Ser. No. 481,798

Claims priority, application Japan, Apr. 30, 1981, 56-65393

Int. Cl.[5] G03G *13/20, 11/00*

U.S. Cl. 430—98 **8 Claims**

1. An electrostatographic process comprising the steps of:

developing a tone electrostatic latent image with a toner material comprising encapsulated toner particles having an average particle size in the range from 0.5 to 1,000 microns, in which the toner particle comprises a pressure fixable adhesive core material containing a colorant and a binder which comprises a liquid having a boiling point higher than 180° C., and a shell enclosing the core material, said shell being prepared by enclosing a droplet of core material dispersed in an aqueous phase with a polymer selected from the group consisting of polyurethane and polyurea by interfacial polymerization, to produce a visible toner image on the latent image; and

fixing the toner image onto a surface of a support medium under application of pressure through rupture of the toner particles.

4,977,053

MAGNETIC-SHELL-COATED TONER

Masao Ohishi, Neyagawa; Katsuaki Kida, Toyonaka; Katsukiyo Ishikawa, Kuze; Takao Saito, Toyonaka, and Kouichi Nagata, Neyagawa, all of Japan, assignors to Nippon Paint Co., Ltd., Osaka, Japan

Continuation of Ser. No. 210,183, Jun. 22, 1988, abandoned, which is a continuation-in-part of Ser. No. 068,158, Jun. 30, 1987, abandoned. This application Sep. 29, 1989, Ser. No. 414,729

Claims priority, application Japan, Jun. 30, 1986, 61-154842

The portion of the term of this patent subsequent to Mar. 28, 2006, has been disclaimed.

Int. Cl.[5] G03G *9/083, 9/093*

U.S. Cl. 430—106.6 **7 Claims**

1. A toner comprising a colored particle and a magnetic shell coated thereon, wherein said colored particle has a diameter of 2 to 30 microns and comprises a binder resin and a coloring agent, and said magnetic shell is an iron oxide type material having a thickness of 0.001 to 1 micron formed by an electroless ferrite plating method which comprises uniformly absorbing ferrous ions on the surface of said colored particles and oxidizing said ferrous ions by an oxidizing agent.

4,977,054

DEVELOPER FOR ELECTROSTATIC IMAGE COMPRISING COATED CARRIER

Toshio Honjo; Yuji Sato, both of Chiba; Yoshihiro Fukushima; Masayoshi Nawa, both of Wakayama, and Shinichiro Yasuda, Osaka, all of Japan, assignors to Kao Corporation, Tokyo and Nippon Iron Powder Co. Ltd., Chiba, both of, Japan

Filed Jul. 5, 1989, Ser. No. 375,497

Claims priority, application Japan, Jul. 22, 1988, 63-183177

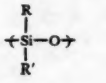
Int. Cl.[5] G03G *9/10*

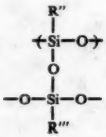
U.S. Cl. 430—108 **17 Claims**

1. A developer for electrostatic images comprising a toner and a carrier, characterized in that said carrier is comprised of a magnetic powder having a composition represented by following formula (I), in which the surfaces of said powder is coated with a resin composition comprising a silicone resin in the form of a combination of segments represented by following general formula (II) and segments represented by following general formula (II') and at least one member selected from the group consisting of compounds represented by following general formula (III), (IV) or (V):

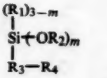
$$(MO)\times(Fe_2O_3)_y \quad (I)$$

(wherein M stands for at least one metal selected from the group consisting of Li, Mg, Mn, Fe(II), Co, Ni, Cu, Zn, Cd, Sr, and Ba; and the molar ratio of x to y is at most 1.0);

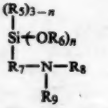
 (II)

 (II')

(wherein R, R', R'' and R''' each stand for a hydrogen atom, a halogen atom, a hydroxyl group, a methoxy group, a lower alkyl group having 1 to 4 carbon atoms, or a phenyl group);

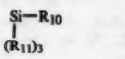
 (III)

(wherein m is 2 or 3, R_1 and R_2 are each an alkyl group having 1 to 3 carbon atoms, R_3 is an alkylene group having 1 to 8 carbon atoms, and R_4 is a glycidoxy group or an epoxycyclohexyl group);

 (IV)

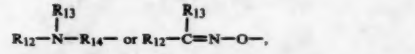
(wherein n is 2 or 3; R_5 or R_6 are each an alkyl group having 1 to 3 carbon atoms; R_7 is an alkylene group having 1 to 3

carbon atoms; R_8 and R_9 are each a hydrocarbon atom, a methyl group, an ethyl group, a phenyl group, an aminomethyl group, or an aminoethyl group); and



(V)

(wherein R_{10} is an alkyl group having 1 to 3 carbon atoms or a vinyl group); and R_{11} is a substituent selected from $R_{12}COO-$, $R_{12}-NH-$, $[R_{12}-O-,]$



wherein R_{12} and R_{13} are each an alkyl group having 1 to 3 carbon atoms, and R_{14} is an alkylene group having 1 to 3 carbon atoms.

4,977,055

LIQUID DEVELOPER FOR ELECTROSTATIC PHOTOGRAPHY

Eiichi Kato; Kazuo Ishii, and Hideyuki Hattori, all of Shizuoka, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Dec. 22, 1989, Ser. No. 454,830

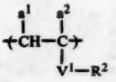
Claims priority, application Japan, Dec. 22, 1988, 63-322168; Jun. 19, 1989, 1-154532

Int. Cl.[5] G03G 9/12

U.S. Cl. 430—114 **7 Claims**

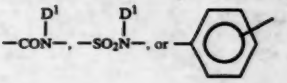
1. A liquid developer for electrostatic photography comprising a resin dispersed in a non-aqueous solvent having an electric resistance of at least 10^9 Ωcm and a dielectric constant of not higher than 3.5, wherein the dispersed resin is a polymer resin obtained by polymerizing a solution containing at least one monofunctional monomer (A) which is soluble in the aforesaid non-aqueous solvent but becomes insoluble after being polymerized, in the presence of at least one resin which is soluble in the aforesaid non-aqueous solvent and does not have a graft group polymerizable with the monomer and at least one oligomer (B) having a number average molecular weight of not more than 1×10^4 and having at least one polar group selected from a carboxy group, a sulfo group, a hydroxy group, a formyl group, an amino group, a phosphono group, and

wherein R^0 represents a hydrocarbon group or $-OR^1$, (wherein R^1 represents a hydrocarbon group) bonded to one terminal only of the main chain of a polymer composed of a recurring unit represented by following formula (I):

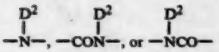


(I)

wherin V^1 represents —COO—, —OCO—, $-(CH_2)-COO-$, $-(CH_2)-OCO-$, —O—, $-SO_2-$, —CONHCOO—, —CONHCONH—,



(wherein D^1 represents a hydrogen atom or a hydrocarbon group having from 1 to 22 carbon atoms and l represents an integer of from 1 to 3); R^2 represents a hydrocarbon group having from 1 to 22 carbon atoms, which may contain —O—, —CO—, $-CO_2-$, —OCO—, $-SO_2-$,



(wherein D^2 has the same meaning as D^1 described above) in the carbon chain thereof; and a^1 and a^2, which may be the same or different, each represents a hydrogen atom, a halogen atom, a cyano group, a hydrocarbon group having 1 to 22 carbon atoms, $-COO-D^3$, or $-COO-D^3$ bonded through a divalent hydrocarbon group having 1 to 22 carbon atoms (wherein D^3 represents a hydrogen atom or a hydrocarbon group having 1 to 22 carbon atoms which may be substituted).

4,977,056

ALKYLHYDROXY BENZYLPOLYAMINE AS ADJUVANT FOR ELECTROSTATIC LIQUID DEVELOPERS

Lyla M. El-Sayed, West Chester, Pa., assignor to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Filed Aug. 10, 1987, Ser. No. 83,185

Int. Cl.[5] G03G 9/12

U.S. Cl. 430—115 **30 Claims**

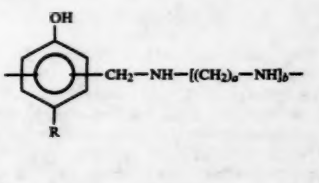
1. An electrostatic liquid developer consisting essentially of

(A) a nonpolar liquid having a Kauri-butanol value of less than 30, present in a major amount,

(B) thermoplastic resin particles having an average by area particle size of less than 10 μm,

(C) a nonpolar liquid soluble charge director selected from the group consisting of ionic, nonionic, and zwitterionic compounds,

(D) an alkylhydroxybenzylpolyamine having a benzyl amine group of the formula:



wherein

a is 2–8,

b is 1–10, and

R is an alkyl group of 1–20,000 carbon atoms, being soluble in the nonpolar liquid.

4,977,057

IMAGE-FORMING METHOD USING SILVER HALIDE AND POLYMERIZABLE COMPOUND

Shunichi Ishikawa, and Koichi Nakamura, both of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Mar. 27, 1989, Ser. No. 328,983
Claims priority, application Japan, Jul. 27, 1988, 63-187803; Jan. 9, 1989, 1-3282
Int. Cl.[5] G03C 5/54; G03F 7/26
U.S. Cl. 430—138 8 Claims

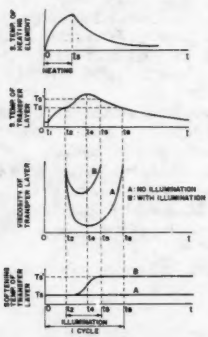
1. An image-forming method which comprises the steps of:
imagewise exposing to light a light-sensitive material comprising a support and a light-sensitive layer which contains silver halide, a reducing agent and an ethylenic unsaturated polymerizable compound, said silver halide and polymerizable compound being contained in microcapsules which are dispersed in the light-sensitive layer; and
simultaneously or thereafter heating the exposed light-sensitive material at a temperature of not lower than 50° C. under such condition that the light-sensitive layer contains a liquid in an amount of 10 to 400 wt. % based on the amount of the polymerizable compound, to imagewise polymerize the polymerizable compound, said liquid being water or a hydrophilic liquid and arranged outside of the microcapsules.

4,977,058

RECORDING MEDIUM COMPRISING A RECORDING LAYER CHANGING ITS TRANSFERABILITY WHEN PROVIDED WITH LIGHT AND HEAT

Masashi Miyagawa, Kawasaki; Masanori Takenouchi, Atsugi, and Norio Ohkuma, Machida, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Filed Dec. 2, 1987, Ser. No. 128,465
Claims priority, application Japan, Dec. 2, 1986, 61-285859
Int. Cl.[5] G03C 1/68, 1/72
U.S. Cl. 430—138 8 Claims



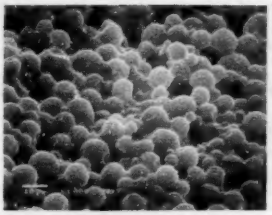
1. A transfer recording medium comprising a support and a transfer recording layer formed thereon, said transfer recording layer irreversibly changing its transferability when simultaneously provided with light and heat energy, the transfer recording layer comprising a colorant and a functional component sensitive to said light and heat energy, the functional component comprising (i) a photoinitiator and (ii) a polymerizing component selected from the group consisting of a monomer, oligomer and prepolymer having an unsaturated double bond, wherein the polymerizing component is solid at room temperature and has a melting point of 40°–150° C.

4,977,059

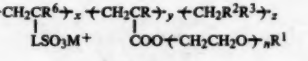
SULFONATED-ETHYLENE OXIDE DISPERSANTS FOR USE IN PREPARING AMINE-FORMALDEHYDE MICROCAPSULES

Rong-Chang Liang; William H. Simpson, both of Centerville; Katherine A. Gyure, Miamisburg, and Kenneth P. Carpenter, Dayton, all of Ohio, assignors to The Mead Corporation, Dayton, Ohio

Filed May 12, 1989, Ser. No. 352,063
Int. Cl.[5] G03C 1/04; C08F 30/04; A61J 5/00
U.S. Cl. 430—138 25 Claims



1. A compound of the formula (I):



where:
M is an alkali metal cation or a quaternary ammonium group,
L is $-(CH_2)_p-$, $-COO(CH_2)_p-$, $-C_6H_4-$ or a direct bond,
R, R^2 and R^6 are the same or different and represent a hydrogen atom or a methyl group;
R^1 is a hydrogen atom, an alkyl group having 1 to 4 carbon atoms, or $-SO_3M$ where M is defined as above; R^3 is $-COOR_4$, $-CO-R^4$, $-CONHR_4$, a pyridinyl group or quaternary salt thereof, $-COOCH_2CH_2N(CH_3)_2$, $-COOCH_2CH_2N^+(CH_3)_3Cl-$ where R^4 is an alkyl group having 1 to 12 carbon atoms, an aralkyl group, an aryl group or $-(CH_2)_m$ —OOC—CR $^2CH_2$, $-(OCH_2CH_2)_m$ COO—CR $^2CH_2$ or $-(CH_2)_m$ NHCO—CR $^2CH_2$;
x is about 0.4 to 0.8;
y is about 0.2 to 0.6;
z is about 0 to 0.1;
n is an integer greater than or equal to 1;
m is an integer of 1 to 4; and
p is an integer of 0 to 4.

4,977,060

METHOD FOR PRODUCING MICROCAPSULES AND PHOTOSENSITIVE MICROCAPSULES PRODUCED THEREBY

Rong-Chang Liang, Centerville; Jesse Hipps, Sr., Dayton, and Jing-Den Chen, Spring Valley, all of Ohio, assignors to The Mead Corporation, Dayton, Ohio

Filed Dec. 7, 1989, Ser. No. 447,283
Int. Cl.[5] G03C 1/72
U.S. Cl. 430—138 15 Claims

1. A process for producing microcapsules comprising the steps of:
adding a water soluble hydroxy or amine functionalized acrylic resin or copolymer to an aqueous emulsion including a dispersed internal phase composition;
simultaneously or subsequently adding a formaldehyde condensate prepolymer to said emulsion; and
forming interpenetrating polymer network microcapsule walls around said internal phase, said interpenetrating polymer network microcapsule walls comprising the condensation reaction product of said functionalized acrylic

resin or copolymer and said formaldehyde condensate prepolymer.

4,977,061

PICTURE CARD AND METHOD OF MAKING THE SAME

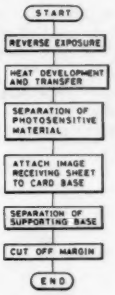
Yoshimi Suganuma, Tokyo, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Aug. 18, 1989, Ser. No. 395,674

Claims priority, application Japan, Aug. 19, 1988, 63-205961; Aug. 19, 1988, 63-205962

Int. Cl.[5] G03C *5/54, 11/12*

U.S. Cl. 430—203 **15 Claims**



1. A method of making a picture sheet, comprising the following steps:

(i) forming a mirror image of an original in a photosensitive layer of a heat development type of photosensitive material;

(ii) putting an image receiving layer of a heat development type of image receiving sheet on said heat development type of photosensitive material so as to superpose said photosensitive layer on and adhere said photosensitive layer to said image receiving layer, said image receiving sheet comprising a supporting sheet, a peelable transparent sheet attached to said supporting sheet, and an image receiving layer coated on said peelable transparent sheet;

(iii) heat-developing and heat-transferring said image formed in said photosensitive layer onto said heat development type of image receiving sheet;

(iv) removing said heat development type of photosensitive material from said heat development type of image receiving sheet;

(v) putting said heat development type of image receiving sheet on a sheet of base material so as to superpose said image receiving layer on and adhere said image receiving layer to said sheet of base material through an adhesive layer previously applied to said sheet of base material; and

(vi) removing said sheet of base material from said heat development type of image receiving sheet.

4,977,062

SILVER HALIDE PHOTOGRAPHIC MATERIALS

Morio Yagihara; Hisashi Okada; Kazunobu Katoh, and Nobuaki Inoue, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Apr. 6, 1988, Ser. No. 178,391

Claims priority, application Japan, Apr. 6, 1987, 62-84468

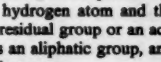
Int. Cl.[5] G03C *1/06*

U.S. Cl. 430—264 **35 Claims**

1. An ultra-high contrast negative type silver halide photographic material comprising:

(1) at least one silver halide emulsion layer on a support;

(2) at least one compound selected from among hydrazine derivatives which can be represented by formula (I) below, which is included in said emulsion layer or in another hydrophilic colloid layer:



(I)

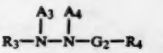
wherein A_1 and A_2 both represent hydrogen atoms or one represents a hydrogen atom and the other represents a sulfinic acid residual group or an acyl group,

R_1 represents an aliphatic group, an aromatic group or a heterocyclic group,

R_2 represents a hydrogen atom, an alkyl group, an aryl group, an alkoxy group, an aryloxy group, or an amino group, and

G_1 represents a carbonyl group, a sulfonyl group, a sulfoxy group, a phosphoryl group or an N-substituted or unsubstituted iminomethylene group, and at least one of R_1 and R_2 has a group which promotes adsorption on silver halide; and

(3) at least one compound selected from among the hydrazine derivatives which can be represented by formula (II) below, which is included in said emulsion layer or in another hydrophilic colloid layer:



(II)

wherein A_3 and A_4 both represent hydrogen atoms or one represents a hydrogen atom and the other represents a sulfinic acid residual group or an acyl group, R_3 represents an aliphatic group, an aromatic group or a heterocyclic group, R_4 represents a hydrogen atom, an alkyl group, an aryl group, an alkoxy group, an aryloxy group or an amino group, G_2 represents a carbonyl group, a sulfonyl group, a sulfoxy group, a phosphoryl group, or an iminomethylene group, the total number of carbon atoms in R_3 and R_4 is at least 13 and R_3 and R_4 comprise no groups for promoting adsorption on silver halide.

4,977,063

SILVER HALIDE PHOTOGRAPHIC LIGHT-SENSITIVE MATERIAL CAPABLE OF OBTAINING HIGH CONTRAST IMAGES

Yasushi Usagawa, Hino, and Fumio Ishii, Akishima, both of Japan, assignors to Konica Corporation, Tokyo, Japan

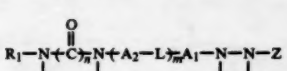
Filed Mar. 2, 1989, Ser. No. 317,719

Claims priority, application Japan, Mar. 3, 1988, 63-50214; Dec. 13, 1988, 63-314543

Int. Cl.[5] G03C *1/34*

U.S. Cl. 430—264 **15 Claims**

1. A light-sensitive silver halide photographic material comprising at least one silver halide emulsion layer containing surface latent image type silver halide grains and a compound represented by the following formula I;



Formula I

wherein A_1 and A_2 are each an arylene group or a heterocyclic group; L is a bonding group; Z is a formyl group, and acyl group, an alkoxycarbonyl group, a thioacyl group or a

group; X is $-NR_6R_7$ or $-OR_8$, in which R_6 and R_7 are each a hydrogen atom, an alkyl group, an alkenyl group, an alkynyl

group, an aryl group, a heterocyclic group, a hydroxy group, an alkoxy group, an alkenylkoxy group, an alkynyloxy group, an aryloxy group or a heterocyclic oxy group, the groups represented by R_6 and R_7 may be bonded together to form a ring, and R_8 is a hydrogen atom, an alkyl group, an alkenyl group, an alkynyl group, an aryl group or a heterocyclic group; n is 1 or 2; m is 0 or 1; and R_1 and R_2 are each a hydrogen atom, an alkyl group, an alkenyl group, an aryl group, a heterocyclic group or an amino group; R_3 is a hydrogen atom or an alkyl group; each pair of R_1 and R_2, and R_1 and R_3 may be bonded together to form a ring, provided that when n is 1, at least one of the R_1 and R_2 is an amino group; and R_4 and R_5 are each a hydrogen atom or a substituent.

4,977,064

OPTICAL RECORDING MEDIUM AND PROCESS FOR FABRICATING THE SAME

Hiroshi Sukawa; Sumio Hirose, both of Yokohama; Shigeru Takahara, Kamakura, and Tomoyoshi Sasakawa, Tokyo, all of Japan, assignors to Mitsui Toatsu Chemicals, Incorporated, Tokyo and Yamamoto Chemicals, Incorporated, Yao, both of, Japan

Filed Apr. 28, 1988, Ser. No. 187,467

Claims priority, application Japan, May 1, 1987, 62-106330

Int. Cl.[5] G11B 7/24; G03C 1/73

U.S. Cl. 430—270 **9 Claims**

1. An optical recording medium having a transparent substrate containing prepits, pregrooves or both for system control signals, which comprises:

(a) a first recording layer formed on the substrate, comprising mainly one or more phthalocyanine dyes, one or more naphthalocyanine dyes, or one or more phthalonaphthalocyanine dyes, said dyes having a transmittance of 10-50%, and a absorbance of about 40% or more at the wavelength of a laser beam used to write information; and

(b) a second recording layer in contact with air formed on said first recording layer, comprising mainly one or more polymethine dyes having an absorbance of about 20% or less and a reflectance of about 25% or more at the air boundary at the wavelength of the laser beam used to write or read out information or both.

4,977,065

PROCESS FOR THE PRODUCTION OF A SUPPORT MATERIAL FOR LIGHT-SENSITIVE MATERIALS WITH AN ANTI-CURL LAYER

Horst Westfal, Osnabruck, and Frits B. Ruben, Bohmte, both of Fed. Rep. of Germany, assignors to Felix Schoeller Jr. GmbH & Co. KG, Fed. Rep. of Germany

Filed Jun. 30, 1988, Ser. No. 213,911

Claims priority, application Fed. Rep. of Germany, Jul. 2, 1987, 3721808

Int. Cl.[5] G03C 1/76

U.S. Cl. 430—271 **16 Claims**

1. A process for the production of a support material for light-sensitive materials with an anti-curl layer of gelatin on the reverse side of the support material, comprising applying to the support material a first coating, containing protein-containing binding agents and hardening agents, of which at least one component is a chromium(III)-salt, drying said first coating in the sol form without prior solidification, applying over said dried first coating a second gelatin-free coating solution containing a hardening agent, which contains a chromium(III)-salt, and drying the second coating.

4,977,066

ALKENYLPHOSPHONIC AND -PHOSPHINIC ACID ESTERS, PROCESS FOR THEIR PREPARATION, AND A RADIATION-POLYMERIZABLE MIXTURE CONTAINING SAID COMPOUNDS

Joachim Gersdorf, Wiesbaden, and Hans-Jerg Kleiner, Kronberg, both of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed May 22, 1989, Ser. No. 354,730

Claims priority, application Fed. Rep. of Germany, May 21, 1988, 3817424

Int. Cl.[5] G03F 7/027; G03C 1/77

U.S. Cl. 430—277 **9 Claims**

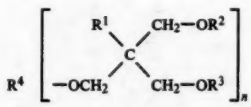
1. A radiation-polymerizable mixture which comprises:

(a) a polymeric binder,

(b) a compound which is polymerizable by means of free radicals, and

(c) a compound which is capable of initiating polymerization of compound (b) under the action of actinic radiation,

wherein said polymerizable compound is a compound of the formula I

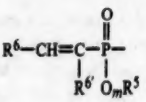


(I)

in which

R^1 denotes an alkyl group having 1 to 4 carbon atoms, CH_2OH or CH_2OR^7,

R^2 denotes a group of formula II

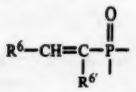


(II)

and

R^3 denotes hydrogen atom or a group of the formula II, or in which

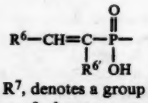
R^2 and R^3 together denote a group of the formula III



(III)

n denotes 1 or 2,

R^4, in the case where n=1, denotes a hydrogen atom, a group of the formula II, or, if R^2 and R^3 form a group of the formula III and R^1 is an alkyl group, denotes a group of the formula IV



(IV)

or, together with R^7, denotes a group of the formula III, and, in the case where n=2, denotes a group of the formula III,

R^5 denotes an alkyl group having 1 to 4 carbon atoms,

R^6 and $R^{6'}$ are identical or different and each denotes a hydrogen atom or an alkyl group having 1 to 4 carbon atoms,

R^7 is a group of the formula II, and

m is 0 or 1.

4,977,067

METHOD OF AND APPARATUS FOR SUPPLYING REPLENISHERS TO AUTOMATIC PROCESSOR

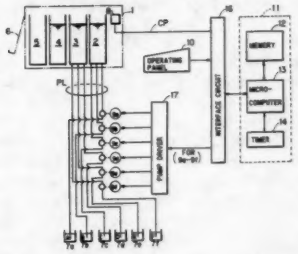
Shoichi Yoshikawa; Yasunobu Awazu, and Eiji Nishimura, all of Kyoto, Japan, assignors to Dainippon Screen Mfg. Co., Ltd., Kyoto, Japan

Filed Aug. 8, 1989, Ser. No. 390,857

Claims priority, application Japan, Aug. 19, 1988, 63-206881; Aug. 19, 1988, 63-206882; Aug. 19, 1988, 63-206883; Aug. 19, 1988, 63-206884

Int. Cl.[5] G03C 5/00

U.S. Cl. 430—398 8 Claims



1. A method of replenishing a treatment liquid in an automatic processor with replenishers which are obtainable by mixing a plurality of chemicals, said treatment liquid being previously supplied to a treatment tank in which exposed photosensitive materials are treated by said treatment liquid for development of said photosensitive materials, said method comprising the steps of:

(a) determining a first time period,

(b) dividing said first time period into two or more time periods to thereby define a series of second time periods,

(c) delivering a first replenisher to said treatment tank wherein the delivery is controlled by a predetermined condition for replenishment in order to replenish said treatment liquid with said first replenisher,

(d) calculating a developed area of photosensitive materials which are treated by said treatment liquid in said treatment tank within each second time period,

(e) comparing said developed area with a predetermined threshold area,

(f) reducing an amount of said first replenisher which is delivered to said treatment tank within a next time period when said developed area exceeds said threshold area,

(g) calculating a total amount of said first replenisher which is delivered to said treatment tank within said first time period,

(h) calculating the difference between a predetermined threshold amount and said total amount, and

(i) delivering a second replenisher to said treatment tank when said first time period is expired in order to replenish said treatment liquid with said second replenisher, wherein an amount of said second replenisher delivered to said treatment tank is determined in accordance with said difference.

4,977,068

SILOXY SUBSTITUTED NAPHTHALOCYANINES AND METHOD OF PREPARATION

Palaiyur S. Kalyanaraman, Fanwood, N.J., assignor to Hoechst Celanese Corp., Somerville, N.J.

Filed Mar. 9, 1990, Ser. No. 490,875

Int. Cl.[5] G03C 1/00, 1/492; C09B 47/04, 47/10

U.S. Cl. 430—495 36 Claims

21. A process for preparing a naphthalocyanine compound containing a central hetero atom having a siloxy group substituent off of said hetero atom, with said siloxy group containing a terminal ether function, which process comprises reacting in the presence of a nucleophile in a moisture free environment

(i) a naphthalocyanine dihydroxy compound,

(ii) a compound of the formula $SiR_1R_2L_2$ wherein R_1 and R_2 can be the same or different and can be alkyl having from 1 to about 18 carbons; aryl having from 6 to 10 carbons; cycloalkyl having at least 4 carbons or alkoxy having at least 3 carbons, and L is a halogen, and

(iii) an ether capping group compound, wherein the ether capping group compound is prepared in substantially moisture free form and added to the reaction medium under moisture free conditions so as to preserve the moisture free environment and increase the yield of the reaction.

4,977,069

SILVER HALIDE COLOR PHOTOGRAPHIC LIGHT SENSITIVE MATERIAL

Toshifumi Iijima, Kokubunji; Yoshitaka Yamada, Hino; Kenji Kumashiro, Hachioji; Hideo Akamatsu, Hachioji, and Takashi Kamio, Hachiojo, all of Japan, assignors to Konishiroku Photo Industry Co., Ltd., Tokyo, Japan

Continuation of Ser. No. 259,466, Oct. 18, 1988, abandoned, which is a continuation of Ser. No. 893,443, Aug. 5, 1986, abandoned, which is a continuation of Ser. No. 712,114, Mar. 15, 1985, abandoned. This application Apr. 13, 1990, Ser. No. 508,470

Claims priority, application Japan, Mar. 16, 1984, 59-50571

Int. Cl.[5] G03C 1/46, 1/76

U.S. Cl. 430—506 10 Claims

1. A silver halide color photographic light-sensitive material comprising a support having arranged thereon at least two red-sensitive layers, at least two green-sensitive layers and at least two blue-sensitive layers, wherein with respect to the red-sensitive layers, there are not less than two silver halide emulsion layers having different sensitivities, wherein with respect to the blue-sensitive layers, there are not less than two silver halide emulsion layers having different sensitivities, and wherein with respect to the green-sensitive layers, there are not less than two silver halide layers having different sensitivities, said halide color photographic light sensitive material satisfying the following four requirements:

a. the highest blue-sensitive halide emulsion layer (BH) of said blue-sensitive layers is arranged to serve as the silver halide emulsion layer in the farthest position from said support;

b. the highest green-sensitive silver halide emulsion layer (GH) of said green-sensitive layers and the highest red-sensitive silver halide emulsion layer (RH) of said red-sensitive layers are interposed between said highest blue-sensitive silver halide emulsion layer (BH) and a lower blue-sensitive silver halide emulsion layer (Bh) having a sensitivity lower than said highest blue-sensitive silver halide emulsion layer (BH);

c. the lowest green-sensitive layer (GL) and the lowest red-sensitive layer (RL) are present between the support and said lower blue-sensitive silver halide emulsion layer (Bh); and

d. a non-light-sensitive hydrophilic colloidal layer is arranged adjacent the surface of the highest blue-sensitive silver halide emulsion layer (BH) closer to said support, with at least one of said highest blue-sensitive silver halide emulsion layer (BH) and said colloidal layer containing substantially non-light-sensitive fine-grain silver halide particles.

4,977,070
TRANSPARENTIZABLE ANTIHALATION LAYERS

John M. Winslow, South St. Paul, Minn., assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Filed May 20, 1986, Ser. No. 865,110
Int. Cl.[5] G03C 1/825
U.S. Cl. 430—510 20 Claims

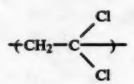
1. A photosensitive imageable article comprising at least two layers, at least one layer of which is a photosensitive imaging layer and at least one other layer optically connected to said at least one layer is an antihalation layer having a transmission optical density of at least 0.3, said antihalation layer being characterized by the fact that it comprises a polymeric material having opacifying means therein selected from the group consisting of voids, bubbles, vesicles, and cells, and by the fact that said antihalation layer is transparentizable by chemically inert processing, said antihalation layer comprising a support layer or there is a third layer present in said article which comprises a support layer.

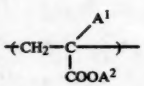
4,977,071
SILVER HALIDE PHOTOGRAPHIC MATERIAL CONTAINING AN INTERLAYER CONTAINING A COPOLYMER CORE-SHELL LATEX

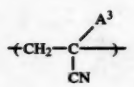
Satoshi Kanetake; Shinichi Hashimoto; Shigetoshi Ono, and Takashi Naoi, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

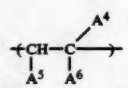
Filed May 24, 1989, Ser. No. 356,161
Claims priority, application Japan, May 24, 1988, 63-126545; Jul. 13, 1988, 63-174698; Jul. 13, 1988, 63-174699
Int. Cl.[5] G03C 1/76
U.S. Cl. 430—534 18 Claims

1. A silver halide photographic material comprising a polyester film support having thereon at least one hydrophilic colloid layer containing a polymer latex; and between the support and the hydrophilic colloid layer a layer containing a vinylidene chloride copolymer core-shell latex; at least one hydrophilic colloid layer of the material being a light-sensitive silver halide emulsion layer, wherein the core of said core-shell latex comprises a vinylidene chloride copolymer comprising at least one repeating unit represented by formula (I) and at least one repeating unit represented by formula (II); and the shell of said core-shell latex comprises a vinylidene chloride copolymer comprising at least one repeating unit represented by formula (I), at least one repeating unit represented by formula (III) and at least one repeating unit represented by formula (IV):


(I)


(II)


(III)


(IV)

wherein A^1 represents hydrogen, methyl or a halogen atom; A^2 represents a substituted or unsubstituted alkyl group or phenyl group; A^3 represents hydrogen or methyl; A^4 represents hydrogen, methyl or —CH_2COOM; A^5 represents hydrogen, methyl or —COOM; A^6 represents —COOM, a COOM-substituted alkoxycarbonyl group, a COOM-substituted phenyl group or a COOM-substituted N-alkylcarbamoyl group; and M represents hydrogen or an alkali metal.

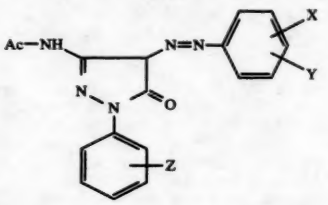
4,977,072
COLOR PHOTOGRAPHIC RECORDING MATERIAL CONTAINING COLOR COUPLERS

Günter Renner, Bergisch Gladbach, and Reinhart Matejec, Leverkusen, both of Fed. Rep. of Germany, assignors to Agfa-Gevaert Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

Continuation of Ser. No. 931,450, Nov. 17, 1986, abandoned. This application Jun. 29, 1988, Ser. No. 214,895
Claims priority, application Fed. Rep. of Germany, Nov. 27, 1985, 3541858
Int. Cl.[5] G03C 7/333, 7/38, 7/384
U.S. Cl. 430—549 7 Claims

1. A color photographic recording material comprising at least one silver halide emulsion layer unit and at least two non-diffusing magenta color couplers, one colorless and the other colored, associated with the silver halide emulsion layer unit, wherein the colored non-diffusing color coupler contains, attached to the coupling position, a diffusion-proofing primary ballast group attached through an azo group and being releasable during the color coupling reaction and optionally, in non-coupling positions, one or more secondary ballast groups so that a hydrophobic dye of limited mobility is formed in the color coupling reaction,

wherein the colored color coupler is a magenta coupler corresponding to the following formula



in which

Ac is a acyl group containing in all at most 9 carbon atoms which does not contain an alkali-solubilizing group, the acyl group being derived from an aliphatic or aromatic carboxylic or sulfonic acid, a carbamic acid or a carbonic acid monoester;

represents one, two or three alkyl groups which are attached directly or through —O—, —S—, —NH—CO or NH—SO_2— and which together contain in all at least 8carbon atoms;

Y represents hydrogen, —OH, halogen; and

Z represents hydrogen or one or more substituents selected from halogen, alkyl, alkoxy, alkylthio, acylamino, alkylsulfonyl and sulfonyl, the substituents mentioned together containing in all no more than 5 carbon atoms.

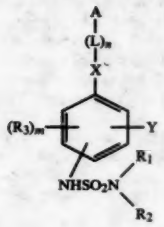
4,977,073
SILVER HALIDE LIGHT-SENSITIVE COLOR PHOTOGRAPHIC MATERIAL

Osamu Ishige; Toyoaki Masukawa; Shuji Kida, and Shigeto Hirabayashi, all of Hino, Japan, assignors to Konica Corporation, Tokyo, Japan

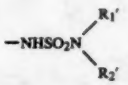
Filed Dec. 23, 1988, Ser. No. 290,176
Claims priority, application Japan, Dec. 28, 1987, 62-333358
Int. Cl.[5] G03C 7/34, 7/36, 7/38
U.S. Cl. 430—549 14 Claims

1. A silver halide light-sensitive color photographic material comprising at least one coupler represented by formula I,

formula I



wherein A represents a coupler residue capable of releasing the remaining group of the formula upon reaction with an oxidation product of a developing agent; L represents a timing group capable of releasing the rest of the group after said remaining group is released from A; n represents 0 or 1; X represents an oxygen or sulfur atom; Y represents a —NHSO$_2$R$_1$′ group, a



group or a —NHCOR$_1$′ group, in which R$_1$′ and R$_2$′ independently represent hydrogen, an aliphatic group, an aromatic group or a heterocyclic group; R$_1$ and R$_2$ independently represent hydrogen, an aliphatic group, an aromatic group or a heterocyclic group; R$_3$ represents a substituent group; m represents 0, 1 or 2, provided that when m is 2, each R$_3$s may be divalent groups to form a ring structure; wherein Y is attached at the 2-position and —NHSO$_2$NR$_1$R$_2$ group is attached at the 4-position of the benzene ring with respect to X, or Y is attached at the 4-position and —NHSO$_2$NR$_1$R$_2$ group is attached at the 2-position of the benzene ring with respect to X.

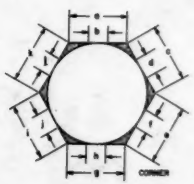
12. The silver halide light-sensitive color photographic material of claim 1, wherein said coupler is contained together with another dye-forming coupler of other than formula [I], which is capable of forming a similar dye in color.

4,977,074

SILVER HALIDE EMULSION COMPRISING SUBSTANTIALLY CIRCULAR MONODISPERSE TABULAR SILVER HALIDE GRAINS AND PHOTOGRAPHIC MATERIAL USING THE SAME

Mitsuo Saitou, and Yoichi Suga, both of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Aug. 17, 1988, Ser. No. 233,110
Claims priority, application Japan, Aug. 17, 1987, 62-203635
Int. Cl.^{5} G03C *1/02*
U.S. Cl. 430—567 **17 Claims**



1. A silver halide emulsion comprising a binder and silver halide grains, wherein the projected area of substantially circular tabular silver halide grains having two twin planes parallel to the basal planes having a linear ratio of less than or equal to 2/5 accounts for from 70% to 100% of the projected area of the whole silver halide grains, and further said substantially circular tabular silver halide grains are monodisperse grains.

4,977,075

SILVER HALIDE PHOTOGRAPHIC EMULSION

Mikio Ihama; Yuji Kume; Koji Tamoto; Hiroshi Takehara, and Masao Arai, all of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Oct. 17, 1988, Ser. No. 258,413
Claims priority, application Japan, Oct. 16, 1987, 62-261054
Int. Cl.^{5} G03C *1/02*
U.S. Cl. 430—567 **20 Claims**

1. A silver halide photographic emulsion comprising a hydrophilic colloid having dispersed therein tabular silver halide grains having an aspect ratio of at least 2, said grains comprising a matrix comprising at least 50 mol% silver bromide ions based on silver ions, and a high silver chloride layer on said matrix, said high silver chloride layer comprising at least 50 mol% chloride ions based on silver ions and forming a substantially uniform plane on said matrix, wherein at least 50 mol% of the high silver chloride layer is present on two basal plane surfaces of said matrix.

4,977,076

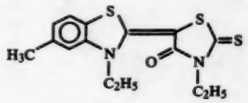
PRESENSITIZED PLATE FOR LITHOGRAPHY

Masaki Okazaki; Kiyohiko Yamamuro, both of Kanagawa; Shigeo Koizumi, and Keisuke Shiba, both of Shizuoka, all of Japan, assignors to Fuji Photo Film Co., Ltd., Minami-ashigara, Japan

Continuation of Ser. No. 910,674, Sep. 23, 1986, abandoned. This application Nov. 16, 1988, Ser. No. 273,748
Claims priority, application Japan, Sep. 30, 1985, 60-217411
Int. Cl.^{5} G03C *1/12, 1/16*
U.S. Cl. 430—583 **7 Claims**

1. A presensitized plate for preparing a lithographic printing plate, comprising a flexible support having provided thereon at least one silver halide light-sensitive layer, said light-sensitive layer containing at least one sensitizing dye selected from the group consisting of the following compounds:

(1)



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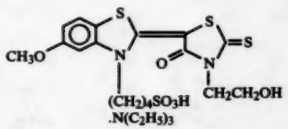
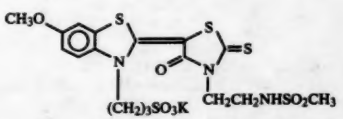


(3)



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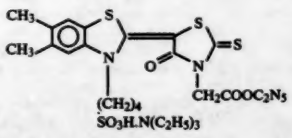

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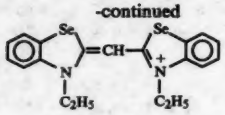
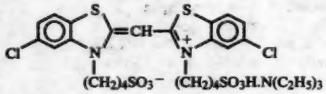


(7)

I^-



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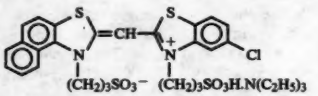

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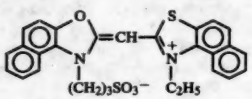

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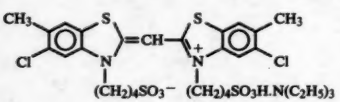
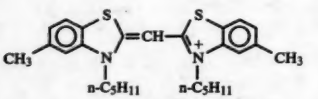
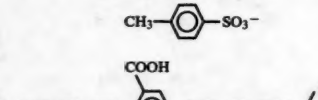


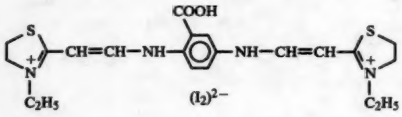
(11)



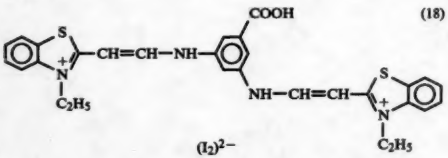
(12)



(17)



(18)



wherein said silver halide is chemically and spectrally sensitized so as to have the maximum spectral sensitivity at a wavelength in the range of 480 nm to 520 nm and is less sensitive to light having a wavelength longer than 540 nm.

4,977,077

INTEGRATED SOLID-PHASE IMMUNOASSAY

That T. Ngo, and Raphael C. Wong, both of Irvine, Calif., assignors to Bioprobe International, Tustin, Calif.

Continuation-in-part of Ser. No. 664,444, Oct. 24, 1984. This application Apr. 25, 1988, Ser. No. 185,218

Int. Cl.[5] C12Q *1/00*

U.S. Cl. 435—7 **4 Claims**

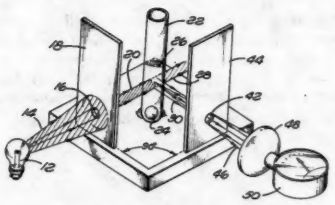
1. A method for determining the concentration of an antigenic analyte ligand in a sample which comprises:

mixing a solid phase supported antibody-fluorescently labeled antigenic analyte ligand complex with a liquid phase sample containing the antigenic analyte ligand to be determined, said liquid phase sample initially containing no fluorescently labeled antigenic analyte ligand, whereby the unlabeled antigenic analyte ligand in said liquid phase sample displaces a part of said fluorescently labeled antigenic analyte ligand from said solid phase supported antibody-fluorescently labeled antigenic analyte ligand complex into the liquid phase, resulting in

(1) a solid phase containing:

(a) solid phase supported antibody-fluorescently labeled antigenic analyte ligand complex, and

(b) solid phase supported antibody-unlabeled antigenic analyte ligand complex, both complexed to said solid phase, and



(2) a liquid phase containing:

(a) fluorescently labeled antigenic analyte ligand displaced from said solid phase supported antibody-fluorescently labeled antigenic analyte ligand complex, and

(b) a reduced concentration of unlabeled antigenic analyte ligand;

measuring the fluorescence of the resulting liquid phase without measuring the fluorescence of the resulting solid phase and without separating the resulting solid phase from the resulting liquid phase; and

determining the concentration of the antigenic analyte ligand in the sample corresponding to the measured fluorescence of the resulting liquid phase.

4,977,078

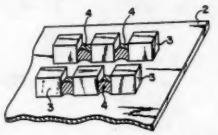
PLATE SUBSTRATE IMMUNOASSAY DEVICE AND METHOD FOR PERFORMING A MULTI-TEST IMMUNOASSAY ON A SPECIMEN

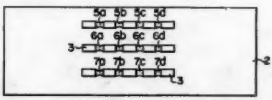
Toshinobu Niimura, Mineola; Tadashi Takahashi, Port Washington; Mutsuro Kashiba, Williston Park; Ko Sakai, New Hyde Park, and Tokio Kano, Bellerose, all of N.Y., assignors to Olympus Optical Co., Ltd., Tokyo, Japan

Filed Dec. 22, 1987, Ser. No. 136,822

Int. Cl.[5] G01N *33/53, 33/48*

U.S. Cl. 435—7 **11 Claims**





9. An immunoassay method for detecting cells with specific cell surface antigens, comprising the steps of:

preparing an immunoassay device having a plate substrate with a flat surface, forming a plurality of adjacent projections projecting from the flat surface of the plate substrate with side walls of adjacent projections facing one another, defining a plurality of flat immunoreaction regions between said projections by fixing immunoassay reagents

corresponding to the specific cell surface antigens in the flat regions defined by the adjacent projections, said projections being separated and surrounding only parts of the immunoreaction regions

such that specimens applied to the immunoreaction regions are supported by adhering to the side walls of the projections and said immunoreaction regions being separated and spaced apart at intervals;

applying a predetermined amount of a cell suspension specimen to the immunoreaction regions;

reacting the specimen with the immunoassay reagents fixed in the immunoreaction regions;

washing away unbound cells; and

checking the immunoreaction regions for bound cells to qualitatively determining the presence of cells with the specific cell surface antigens.

4,977,079

METHOD FOR THE DETERMINATION OF ANTI-P. FALCIPARUM SPOROZOITE ANTIBODIES IN HUMAN BLOOD

Carlo A. Nuzzolo, Rome; Adriano Bernardi, Monterotondo; Antonello Pessi, Rome, and Antonio S. Verdini, Monterotondo, all of Italy, assignors to Enircerche S.p.A., Milan, Italy

Filed Dec. 17, 1987, Ser. No. 134,229

Claims priority, application Italy, Dec. 23, 1986, 22817 A/86

Int. Cl.[5] G01N *33/535, 33/543, 33/566, 33/569*

U.S. Cl. 435—7 **10 Claims**

1. Immunoenzymatic (EIA) method for detecting anti-P. falciparum sporozoite antibodies in human blood, serum or plasma, comprising:

(a) incubating a human blood, serum, or plasma sample in the presence of the synthetic antigen-enzyme conjugate: $(Asn\text{-}Ala\text{-}Asn\text{-}Pro)_n\text{-}E$ wherein n is an integer from 17 to 40 and E is an enzyme capable of yielding a colorimetric reaction with a specific substrate and wherein said conjugate is capable of forming with any sporozoite antibody the stable complex $Ab\text{-}(Asn\text{-}Ala\text{-}Asn\text{-}Pro)_n\text{-}E$ without deactivating the enzyme activity;

(b) subsequently incubating the sample of step (a) with a solid support which has adsorbed on it Protein-A capable of binding said antibody of said complex, and

(c) determining the enzymatic activity of the complex bound to Protein-A by adding a colorless enzymatic substrate for said enzyme capable of yielding a colored product if antibodies are present in said sample.

4,977,080

CHEMILUMINESCENT METHODS AND A KIT THEREFOR INVOLVING A BETA-LACTAM

Dean S. Milbrath, Oakdale, Minn., assignor to Minnesota Mining and Manufacturing Co., St. Paul, Minn.

Continuation of Ser. No. 597,483, Apr. 6, 1984, abandoned. This application Feb. 9, 1987, Ser. No. 12,425

Int. Cl.[5] C12Q *1/28*

U.S. Cl. 435—28 **7 Claims**

1. In a method of assay for the detection or quantification of a component of a chemiluminescent reaction, said chemiluminescent reaction involving a chemiluminescent compound and a peroxide source, said component to be detected or quantified being one of said chemiluminescent compound, said peroxide source, and an oxidation catalyst which participates in the chemiluminescent reaction, the improvement comprising the inclusion of a beta-lactam and a base in said assay, said base being present in an amount such that said assay is carried out at a basic pH, and wherein said beta-lactam is present in an amount sufficient to enhance the light output of said chemiluminescent reaction and thereby enhance the sensitivity of said assay for the detection or quantification of said component of said chemiluminescent reaction.

4,977,081

STABLE RABBIT-MOUSE HYBRIDOMAS AND SECRETION PRODUCTS THEREOF

Torquil J. G. Raybould, North Vancouver, and Miyoko Takahashi, Downsview, both of Canada, assignors to Adi Diagnostics, Inc., Rexdale, Canada

Continuation of Ser. No. 189,754, May 3, 1988, abandoned, which is a continuation-in-part of Ser. No. 46,439, May 4, 1987, abandoned. This application Apr. 4, 1990, Ser. No. 504,689

Int. Cl.[5] C12P *12/00;* **C12N** *5/00, 15/00;* **G01N** *33/53*

U.S. Cl. 435—70.21 **18 Claims**

1. A stable rabbit-mouse hybridoma which secretes intact rabbit monoclonal antibody of defined specificity produced by the process of culturing the hybridoma in a nutrient medium containing rabbit serum.

4,977,082

TYPE VI BACTERIAL FC RECEPTORS

Michael D. P. Boyle, and Kathleen J. Reis, both of Gainesville, Fla., assignors to University of Florida Research Foundation, Inc., Gainesville, Fla.

Division of Ser. No. 131,071, Dec. 10, 1987. This application Nov. 9, 1988, Ser. No. 269,201

Int. Cl.[5] C12P *21/00;* **C07K** *15/00, 1/14;* **C12N** *1/00*

U.S. Cl. 435—71.1 **9 Claims**

1. Essentially pure bacterial Fc receptor denoted type VI which is characterized by (1) having a molecular weight of about 43,000 daltons, (2) being antigenically distinct from known bacterial Fc receptors type I, II and III, and (3) displaying unique immunological profiles when compared to known type IV and type V receptors.

4,977,083

PROCESSES FOR PREPARING A54145 COMPOUNDS

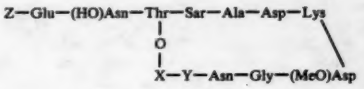
LaVerne D. Boeck, Indianapolis, Ind., assignor to Eli Lilly and Company, Indianapolis, Ind.

Filed Apr. 11, 1988, Ser. No. 179,930

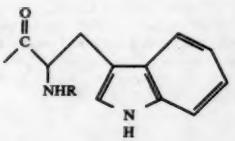
Int. Cl.[5] C12P *21/04;* **A61K** *37/02;* **C07K** *7/64*

U.S. Cl. 435—71.3 **13 Claims**

1. A process for preparing an A54145 component of the formula:



wherein Z is a group of formula



R is selected from n-decanoyl, 8-methyldecanoyl and 8-methylnonanoyl;

X is Ile or Val; and

Y is Glu or 3—MG;

provided that: (1) when X=Val and Y=3—MG, R must be 8-methyldecanoyl; and (2) when X=Val and Y=Glu, R must be 8-methylnonanoyl;

which comprises adding a C_4–C_{18} alkyl or alkenyl alcohol, a C_4–C_{18} alkanoic or alkenoic acid, an ester of a C_4–C_{18} alkanoic or alkenoic acid, or a salt of a C_4–C_{18} alkanoic or alkenoic acid, to an A54145-producing culture of *Streptomyces fradiae,* strains NRRL 18158, NRRL 18159, or NRRL 18160, or an A54145-producing mutant thereof, starting from about 20 hours to

about 26 hours after initiating the production stage, and continuing throughout the fermentation until a recoverable amount of A54145 component is produced.

4,977,084

PRODUCTION, ISOLATION, AND IDENTIFICATION OF NOVEL ANTIFUNGAL COMPOUNDS

Alan R. Putnam, Haslett, Mich.; Saroj K. Mishra, Houston, Tex.; Muraleedharan G. Nair, East Lansing, Mich., assignor to Board of Trustees operating Michigan State University, East Lansing, Mich.

Filed Feb. 16, 1989, Ser. No. 311,299
Int. Cl.[5] C12R *1/29;* C12P *19/56*
U.S. Cl. 435—78 11 Claims

1. A biologically pure culture of mycelium of *Micromonospora spartanea* ATCC 53803.

4,977,085

CLONING AND EXPRESSION OF YEAST STE13 AND DPP2 GENES ENCODING DIPEPTIDYL AMINOPEPTIDASE A AND B

George Sprague, Eugene, Oreg.; Ira Herskowitz; Jeremy Thorner, both of Berkeley, Calif.; David Julius, New York, N.Y.; Lindley Blair, Los Angeles, and Anthony Brake, Berkeley, both of Calif., assignors to The Board of Regents of the Univ. of California, Berkeley, Calif.

Filed Feb. 29, 1984, Ser. No. 584,619
Int. Cl.[5] C12N *9/48, 15/00, 1/20;* C07H *17/00*
U.S. Cl. 435—212 26 Claims

21. A method of expressing yeast dipeptidyl aminopeptidase A in a eukaryotic cell culture comprising a step of transforming said culture with a vector capable of expressing said aminopeptidase.

24. A method of expressing yeast dipeptidyl aminopeptidase B in a eukaryotic cell culture comprises a step of transforming said culture with a vector capable of expressing said aminopeptidase in yeast.

4,977,086

MONOCLONAL ANTIBODIES TO A BROAD RANGE OF MAMMALIAN TERMINAL DEOXYNUCLEOTIDYL TRANSFERASES

R. Graham Smith, Dallas, Tex., assignor to The Board of Regents of the University of Texas System, Austin, Tex.

Continuation of Ser. No. 802,039, Nov. 26, 1985. This application Jun. 12, 1989, Ser. No. 365,100
The portion of the term of this patent subsequent to Jun. 13, 2006, has been disclaimed.
Int. Cl.[5] C12N *5/00, 15/00*
U.S. Cl. 435—240.27 10 Claims

1. A murine monoclonal antibody which reacts with a common peptide of terminal deoxynucleotidyl transferase (TdT) wherein said peptide has a molecular weight of approximately 11,00 daltons selected from a group of mammalian cells consisting of human, bovine, mouse, rat and rabbit cells, said monoclonal antibody also being reactive with said peptide of undigested bovine TdT.

4,977,087

METHOD OF REGENERATING PLANTLETS FROM MESOPHYLL PROTOPLASTS OF PHASEOLUS ANGULARIS

Ge Koulin; Wang Yunzhu; Yuan Xunmei, and Huang Peiming, all of Shanghai, China, assignors to Interferon Sciences, Inc., New Brunswick, N.J.

Filed Jan. 19, 1988, Ser. No. 145,851
Int. Cl.[5] C12N *5/02, 5/00*
U.S. Cl. 435—240.47 4 Claims

1. A method of regenerating *Phaseolous angularis* plantlets from protoplasts which comprises obtaining protoplasts from the mesophyll of abacterial seedings of *P. angularis,* culturing the protoplasts so obtained in a suitable protoplast culture medium comprising a 0.5M to 0.6M of glucose, and a mixture of phytohormones comprising 2,4-D and at least one other hormone selected from the group consisting of 6BA, and Zeatin, to produce calli and culturing the calli so produced on a suitable differentiation medium comprising 6BA and at least one other hormone selected from the group consisting of 2,4-D and a mixture of NNA and IAA; differentiating the calli under long wave red light so as to produce *P. angularis* plantlets.

4,977,088

VECTOR PLASMID SUITED FOR SOURING AGENTS, DAIRY SOURING AGENTS IN PARTICULAR

Atte J. von Wright, Espoo; Seppo K. Sivelä, Helsinki, and Soile S. H. Tynkkynen, Espoo, all of Finland, assignors to Valio Meijerien Keskusosuusliike, Helsinki, Finland

Filed Jun. 24, 1987, Ser. No. 65,882
Claims priority, application Finland, Jun. 24, 1986, 862683
Int. Cl.[5] C12N *1/20, 15/00;* C12P *21/00*
U.S. Cl. 435—252.3 2 Claims

1. Plasmid pVS2.

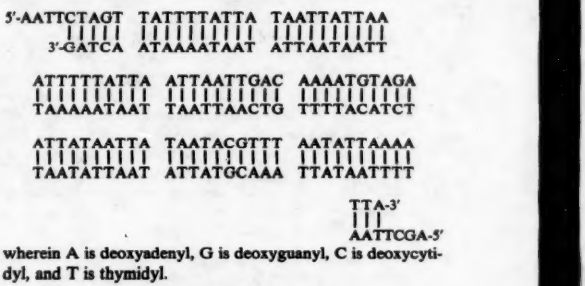
4,977,089

VECTOR COMPRISING SIGNAL PEPTIDE-ENCODING DNA FOR USE IN BACILLUS AND OTHER MICROORGANISMS

Steven Kovacevic; James R. Miller, both of Indianapolis, Ind.; Loraine E. Veal, Phoenix, Ariz., and John S. Wood, Indianapolis, Ind., assignors to Eli Lilly and Company, Indianapolis, Ind.

Filed Jan. 30, 1987, Ser. No. 10,245
Int. Cl.[5] C12N *15/70, 15/75*
U.S. Cl. 435—252.31 24 Claims

1. A recombinant DNA vector that comprises the DNA sequence



wherein A is deoxyadenyl, G is deoxyguanyl, C is deoxycytidyl, and T is thymidyl.

4,977,090

PROCESS FOR THE TREATMENT OF OXYGENATED EXHAUST GASES

Aloys Hutterman, Busgenweg 2; Andrzej Majcherczyk, both of D-3400 Gottingen, and Frantisek Zadrazil, D-3171 Hillerse, all of Fed. Rep. of Germany

Filed Mar. 3, 1989, Ser. No. 318,610
Claims priority, application Fed. Rep. of Germany, Mar. 4, 1988, 3807033
Int. Cl.[5] A61L *9/01*
U.S. Cl. 435—266 9 Claims

1. A process for the decontamination of a gas containing oxygen and an organic or volatile inorganic contaminant, comprising

bringing said gas into contact with an active mycelium of pocket rot mushrooms grown on a substrate made from agricultural wastes, forestry wastes, fishery wastes, or wastes from the wood processing industry, said substrate being configured into a body form.

4,977,091

METHOD FOR PREPARING PHOSPHATIDYLINOSITOL FROM VEGETABLE MATTER

Murat K. Gilmanov, mikrorajon "Koktem-3", 13 kv. 62; Raai Dilbarkanova, ulitsa Satpaeva, 93, kv. 27, and Beibyt E. Sultanbaev, ulitsa krasina, 107, kv. 92, all of, Alma-Ata, U.S.S.R.

PCT No. PCT/SU87/00059, § 371 Date Jun. 30, 1988, § 102(e) Date Jun. 30, 1988, PCT Pub. No. WO88/03407, PCT Pub. Date May 19, 1988

PCT Filed May 21, 1987, Ser. No. 241,980

Claims priority, application U.S.S.R., Nov. 12, 1986, 4142793

Int. Cl.[5] C11C *1/00*; C07F *9/10*

U.S. Cl. 435—271 8 Claims

1. A method of preparing phosphatidylinositol from vegetable matter containing phosphatidylinositol comprising the steps of:

homogenization of the vegetable matter in a watersalt solution with a molar concentration of from 0.005 to 1M at a pH within the range of from 5.0 to 11.0;

separation of the homogenizate into a cell-free water-salt phase containing particles of a protein-phosphatidylinositol complex and a residue containing unbroken cells and particles of other phospholipids, by way of centrifugation at a gravity acceleration value ranging from 3,000 to 30,000 g, or by filtration on a filter with a pore size of from 3 to 50 μm;

separation of particles of the protein-phosphatidylinositol complex from the cell-free water-salt phase;

extraction of phosphatidylinositol from the separated particles of the protein-phosphatidylinositol complex.

4,977,092

EXPRESSION OF EXOGENOUS POLYPEPTIDES AND POLYPEPTIDE PRODUCTS INCLUDING HEPATITIS B SURFACE ANTIGEN IN YEAST CELLS

Grant A. Bitter, Thousand Oaks, Calif., assignor to Amgen, Thousand Oaks, Calif.

Continuation of Ser. No. 748,712, Jun. 26, 1985, abandoned, which is a continuation of Ser. No. 412,707, Aug. 30, 1982, abandoned. This application Aug. 8, 1988, Ser. No. 231,599

Int. Cl.[5] C12N *15/00, 1/16, 1/18*; C12P *21/00*

U.S. Cl. 435—320 10 Claims

1. A yeast cell transformation vector comprising: (1) a DNA transcription promoter/regulator DNA sequence duplicative of that endogenous to yeast cell synthesis of mRNA coding for glyceraldehyde-3-phosphate dehydrogenase wherein said DNA does not include the 26 base pairs having the sequence

CGAATAAACACACATAAATAAACAAA
GCTTATTTGTGTGTATTTATTTGTTT;

(2) a DNA sequence transcribable into mRNA coding for synthesis of a polypeptide exogenous to yeast cells; (3) a DNA sequence duplicative of that coding for termination of transcription or poly-A addition of mRNA in yeast cells; and (4) a DNA sequence operative n yeast cells to confer to said vector the capacity for autonomous DNA replication wherein said yeast is *Saccharomyces cerevisiae.*

4,977,093

PROCESS FOR ANALYZING CARBONYL SULFIDE IN A GAS

Steven J. Cooke, Clarendon Hills, Ill., assignor to Liquid Air Corporation, Walnut Creek, Calif.

PCT No. PCT/US86/02402, § 371 Date Apr. 7, 1988, § 102(e) Date Apr. 7, 1988

PCT Filed Nov. 3, 1986, Ser. No. 224,711

Int. Cl.[5] G01N *21/78, 31/22*

U.S. Cl. 436—119 16 Claims

1. A process for the detection of carbonyl sulfide in a gas comprising:

providing a known volume of gas to be analyzed;

removing any H_2S from said volume of gas;

converting carbonyl sulfide present in said gas volume to H_2S;

detecting and measuring the resulting H_2S determining the amount of carbonyl sulfide present in the original gas volume by comparing the amount of H_2S detected as a molar equivalent of said carbonyl sulfide present in the original gas volume.

4,977,094

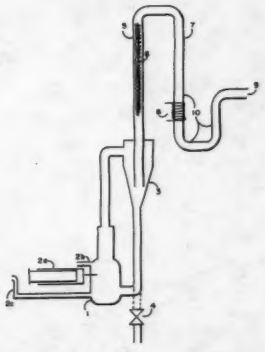
PROCESS FOR MONITORING THE QUALITY OF WATER

Arthur J. Goldstein, Weston, and Edgardo J. Parsi, Lexington, both of Mass., assignors to Ionics, Incorporated, Watertown, Mass.

Division of Ser. No. 138,757, Dec. 28, 1987, Pat. No. 4,940,667. This application Oct. 23, 1989, Ser. No. 426,614

Int. Cl.[5] G01N *1/18*

U.S. Cl. 436—157 6 Claims



1. A process for monitoring volatile organic compounds in water comprising gently boiling at least part of a first portion of said water containing volatile organic compounds into a heated zone while maintaining the temperature of said zone substantially less than 450 °C., collecting and condensing at least part of the first portion of water vapor from said zone into a first condensed liquid water sample and measuring the electrical impedance of said first condensed liquid water sample thereby obtaining a first impedance measurement, subsequently gently boiling at least part of a second portion of said water into said zone while maintaining the temperature in said zone in the range of from about 450° to about 1000° C., whereby reformable and/or oxidizable volatile organic compounds in said water are reformed and/or oxidized at least in part into second compounds volatile in said temperature range which second compounds are at least partially soluble in water and at least partially ionizable therein, collecting and condensing at least part of the second portion of water vapor from said zone into a second condensed liquid water sample measuring the electrical impedance of said second condensed liquid water sample thereby obtaining a second impedance measurement and comparing said first and second impedance measurements to determine the volatile organic content of said water.

4,977,095

LIQUID-ABSORPTION PRECONCENTRATOR SAMPLING INSTRUMENT

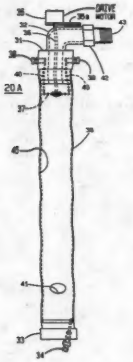
Solomon Zaromb, Hinsdale, Ill., assignor to The United States of America as represented by the United States Department of Energy, Washington, D.C.

Continuation-in-part of Ser. No. 892,990, Aug. 4, 1986, Pat. No. 4,829,008. This application Mar. 30, 1989, Ser. No. 330,655

The portion of the term of this patent subsequent to Mar. 27, 2007, has been disclaimed.

Int. Cl.[5] G01N 1/18

U.S. Cl. 436—178 22 Claims



1. A method for preconcentrating traces of an analyte in a gaseous medium, said method comprising the steps of: immersing one end of a wicking material into a reservoir of an analyte-sorbing liquid so that the liquid moves slowly to the other end of the wicking material for wetting most of the length thereof, flowing the gaseous medium over the wetted length of said material in contact therewith for trapping and preconcentrating traces of analyte in the sorbing liquid, and collecting from the other end of the wicking material the sorbing liquid containing the preconcentrated traces of analyte.

8. Apparatus for preconcentrating traces of an analyte in a gaseous medium comprising: an elongated gas impermeable container, wettable material disposed in said container and extending through most of the length thereof, means for continuously wetting said wettable material adjacent to one end thereof with an analyte-sorbing liquid so that the liquid moves slowly to the other end of said material for wetting most of the length thereof, means for flowing the gaseous medium through said container in contact with said wetted material for trapping and preconcentrating traces of analyte in the sorbing liquid, means for removing from said container the sorbing liquid containing the preconcentrated traces of analyte, and a reservoir of the analyte-sorbing liquid, in communication with a tube integral with the container, said wettable material being a wicking material, and one end of said wicking material being immersed in the liquid in said reservoir.

4,977,096

METHOD OF MAKING A PHOTOSENSOR USING SELECTIVE EPITAXIAL GROWTH

Tetsuya Shimada, Zami; Satoshi Itabashi, Atsugi, and Katsunori Hatanaka, Yokohama, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

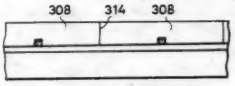
Division of Ser. No. 211,031, Jun. 24, 1988, Pat. No. 4,866,291.

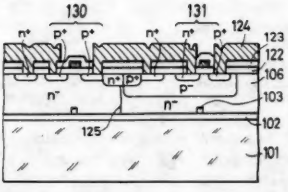
This application May 25, 1989, Ser. No. 356,882

Claims priority, application Japan, Jun. 30, 1987, 62-162577; Jun. 30, 1987, 62-162578; Jun. 30, 1987, 62-162579; Jun. 30, 1987, 62-162581

Int. Cl.[5] H01L 31/18, 21/70

U.S. Cl. 437—2 2 Claims





1. A method of manufacturing an image reading apparatus including a set of a sensor unit and a transfer unit for transferring an output signal from the sensor unit, the sensor unit and the transfer unit being formed on a substrate whose at least surface portion has an insulating property, including the steps of forming on the surface portion of the substrate a nucleus formation surface which has a sufficiently higher nucleation density than that of a material of the surface portion of the substrate, consists of a material different from that of the substrate, and has a micropattern enough to allow growth of only a single nucleus, growing a crystal centered on the single nucleus so as to form a single-crystal semiconductor layer on the surface of the substrate, forming the single transfer unit in a portion including the semiconductor layer, and forming the sensor unit on the signal transfer unit.

4,977,097

METHOD OF MAKING HETEROJUNCTION P-I-N PHOTOVOLTAIC CELL

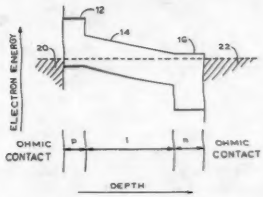
Peter V. Meyers, Green Lane, Pa.; Chung-Heng Liu, Princeton Junction, N.J., and Timothy J. Frey, Schwenksville, Pa., assignors to Ametek, Inc., Paoli, Pa.

Continuation of Ser. No. 203,610, Jun. 2, 1988, Pat. No. 4,873,198, which is a division of Ser. No. 118,610, Nov. 9, 1987, abandoned, which is a continuation of Ser. No. 922,122, Oct. 21, 1986, Pat. No. 4,710,589. This application Aug. 1, 1989, Ser. No. 390,986

The portion of the term of this patent subsequent to Dec. 1, 2004, has been disclaimed.

Int. Cl.[5] H01L *31/18*

U.S. Cl. 437—4 25 Claims



22. A method of making a heterojunction p-i-n photovoltaic cell having at least three different semiconductor layers, composed together of at least four different elements, comprising the steps of:

forming an n-type, relatively wide band gap semiconductor layer of a polycrystalline II–IV compound on a substrate;

forming on the n-type layer a high resistivity intrinsic semiconductor layer of a polycrystalline II–VI compound, used as an absorber of light radiation;

forming on the intrinsic layer a p-type, relatively wide band gap semiconductor layer of a polycrystalline II–VI compound; the intrinsic layer being in electrically conductive contract on one side with the p-type layer and on an opposite side with the n-type layer; and

forming first and second ohmic contacts in electrically conductive contact with the p-type layer and the n-type layer, respectively.

4,977,098

METHOD OF FORMING A SELF-ALIGNED BIPOLAR TRANSISTOR USING AMORPHOUS SILICON

Hyunkyu Yu; Sangwon Kang, and Jinhyo Lee, all of Chungnam, Rep. of Korea, assignors to Korea Electronics & Communications Research Inst., Rep. of Korea

Filed Jun. 23, 1989, Ser. No. 370,885

Claims priority, application Rep. of Korea, Sep. 7, 1988, 88-11545[U]

Int. Cl.[5] H01L *21/265, 21/283*

U.S. Cl. 437—31 6 Claims

1. A method of manufacturing a semiconductor device comprising the steps of:

(a) removing unwanted material from the surface of a semiconductor substrate of a first conductivity type;

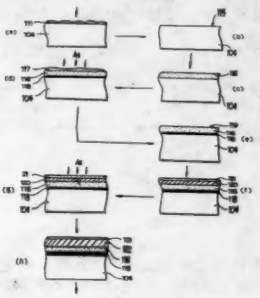
(b) forming a first amorphous semiconductor layer doped with impurities of a second conductivity type on said surface of said semiconductor substrate;

(c) heating the structure resulting from step (b), thereby diffusing impurities within said first amorphous semiconductor layer into said substrate, so as to form therein a semiconductor region of said second conductivity type;

(d) removing unwanted material from the surface of said first amorphous semiconductor layer that has been formed thereon during step (c);

(e) forming a metallic film and an overlying second amorphous semiconductor layer doped with impurities of said second conductivity type on said surface of said first amorphous semiconductor layer; and

(f) forming a laminate structure of said first amorphous layer, a metallic-semiconductor compound and said second amorphous layer, by heating the structure resulting



from step (e), so as to cause semiconductor material of said first and second amorphous layers to combine with said metallic film and convert said metallic film to said metallic-semiconductor compound adjoining said first and second amorphous layers.

4,977,099

METHOD FOR FABRICATING SEMICONDUCTOR MEMORY DEVICE

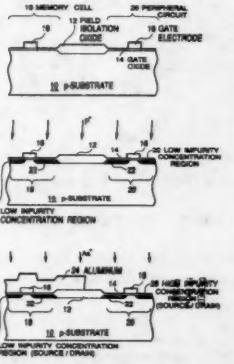
Hiroshi Kotaki, Tokyo, Japan, assignor to NEC Corporation, Tokyo, Japan

Filed Oct. 31, 1989, Ser. No. 430,691

Claims priority, application Japan, Oct. 31, 1988, 63-276482

Int. Cl.[5] H01L *21/265*

U.S. Cl. 437—52 8 Claims


10 MEMORY CELL
20 PERIPHERAL CIRCUIT
12 FIELD ISOLATION OXIDE
18 GATE ELECTRODE
14 GATE OXIDE
10 p-SUBSTRATE
30 LOW IMPURITY CONCENTRATION REGION
22 LOW IMPURITY CONCENTRATION REGION
24 ALUMINUM
36 HIGH IMPURITY CONCENTRATION REGION (SOURCE/DRAIN)
32 LOW IMPURITY CONCENTRATION REGION (SOURCE / DRAIN)

1. A method for fabricating a semiconductor memory device which includes a single substrate, at least one memory cell including at least one MOS transistor formed on said single substrate, and a peripheral circuit having at least one MOS transistor formed on said single substrate, comprising the steps of forming on said single substrate a gate electrode for each of the MOS transistors of said memory cell and said peripheral circuit, ion-implanting impurities at a low dosage by using said gate electrodes as a mask so as to forming a low impurity concentration of source/drain regions of the MOS transistors of said memory cell and said peripheral circuit, depositing a

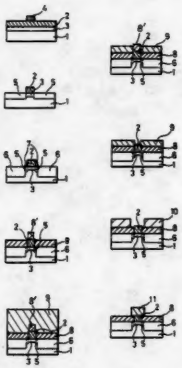
mask layer to cover an area of said memory cell, and ion-implanting impurities at a high dosage by using said mask layer as a mask, so as to dope impurities to only the source/drain regions of the MOS transistor of said peripheral circuit, so that the MOS transistor of said memory cell has the source/drain regions of a low impurity concentration, and the MOS transistor of said peripheral circuit has the source/drain regions including a high impurity concentration portion.

4,977,100

METHOD OF FABRICATING A MESFET

Teruyuki Shimura, Itami, Japan, assignor to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Oct. 5, 1989, Ser. No. 417,288
Claims priority, application Japan, Oct. 12, 1988, 63-258007
Int. Cl.[5] H01L *21/265, 21/311*
U.S. Cl. 437—44 **20 Claims**



1. A method of producing a semiconductor MESFET, comprising:

forming an active layer on one surface of a semiconductor substrate;

forming a refractory metal gate structure on the active layer;

implanting a source and a drain region in said semiconductor substrate utilizing at least said gate structure as a mask therefor;

forming an insulating film on said semiconductor substrate with a film portion over said gate structure separated from film portions over the source and drain regions;

forming a flattening resist over the insulating film and etching away said flattening resist until said separate insulating film portion on said gate structure is exposed;

removing said insulating film portion on said gate structure while protecting the insulating film portions on the source and drain regions from removal, removing the remaining flattening resist to expose the protected insulating film portions; and

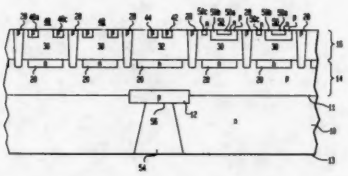
depositing a low resistance metal on said gate structure and overlying a portion of the insulating film on the source and drain regions.

4,977,101

MONOLITHIC PRESSURE SENSITIVE INTEGRATED CIRCUIT

Douglas J. Yoder, Sharpsville; Ronald E. Brown, Kokomo; Paul E. Stevenson, Kokomo; Donald L. Hornback, Kokomo, and Ronald K. Leisure, Kokomo, all of Ind., assignors to Delco Electronics Corporation, Kokomo, Ind.

Division of Ser. No. 189,446, May 2, 1988, Pat. No. 4,885,621.
This application Aug. 21, 1989, Ser. No. 396,250
Int. Cl.[5] H01L *21/70, 21/265*
U.S. Cl. 437—51 **4 Claims**



1. A process for making a monolithic pressure sensitive integrated circuit comprising:

forming on one surface of a monocrystalline semiconductor member a localized etch stop region;

growing in turn over said one surface first and second epitaxial layers of mutually opposite conductivity types;

said first epitaxial layer having a higher resistivity adjacent said substrate than adjacent said second epitaxial layer;

forming buried layers between said first and second epitaxial layers;

forming in said second epitaxial layer in the region overlying the etch stop a plurality of piezoresistors and in the surrounding region the remainder of the integrated circuit and interconnecting said remainder and the piezoresistors into the desired integrated circuit; and

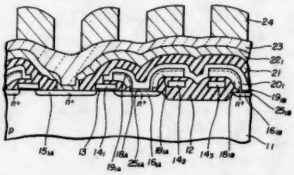
etching anisotropically the back surface of the element in the region underlying the element in the etch stop region to thin the element in the region underlying the piezoresistors.

4,977,102

METHOD OF PRODUCING LAYER STRUCTURE OF A MEMORY CELL FOR A DYNAMIC RANDOM ACCESS MEMORY DEVICE

Taiji Ema, Kanagawa, Japan, assignor to Fujitsu Limited, Kawasaki, Japan

Division of Ser. No. 269,690, Nov. 10, 1988, Pat. No. 4,910,566.
This application Jul. 7, 1989, Ser. No. 377,002
Claims priority, application Japan, Nov. 17, 1987, 62-288510
Int. Cl.[5] H01L *21/70*
U.S. Cl. 437—52 **7 Claims**



1. A method of producing a layer structure of a memory cell for dynamic random access memory device comprising the steps of:

forming an insulation film on a semiconductor substrate;

forming a first conductive film on the insulation film, the first conductive film being used for forming a part of a storage electrode of a memory cell capacitor;

patterning the first conductive film and the insulation film so as to form a window used for forming a contact between the storage electrode and the semiconductor substrate;

forming a second conductive film so as to cover the window and the first conductive film, the second conductive film being used for forming the remaining part of the storage electrode;

patterning the first conductive film and the second conductive film, patterned first and second conductive films constructing the storage electrode;

forming a dielectric film so as to cover the storage electrode; and

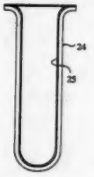
forming a third conductive film so as to cover the dielectric film, the third conductive film being an opposed electrode which is paired with the storage electrode of the memory cell capacitor.

4,977,103

METHOD OF MAKING AN ARTICLE COMPRISING A III/V SEMICONDUCTOR DEVICE

Naresh Chand, Berkeley Heights, N.J., assignor to AT&T Bell Laboratories, Murray Hill, N.J.

Filed Aug. 24, 1989, Ser. No. 398,115
Int. Cl.[5] H01L *21/203*
U.S. Cl. 437—105 6 Claims



1. Method of making an article comprising a semiconductor device comprising a compound semiconductor material on a single crystal semiconductor substrate, the compound semiconductor material comprising at least one first metal selected from the group consisting of Ga and In, and further comprising at least one further element, the method comprising

(a) providing the semiconductor substrate, the substrate having a major surface;

(b) growing on the major surface a layer of the compound semiconductor material by a technique that comprises

(i) evaporating a quantity of the first metal from a crucible having an orifice and an interior surface, the crucible comprising material that is not wetted by the first metal, the crucible positioned such that at least a part of the evaporated first metal is deposited on the major surface; and

(ii) causing deposition of a quantity of the further element on the major surface; and

(c) carrying out one or more further steps towards completion of the article;

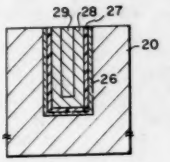
characterized in that at least a part of the interior surface of the crucible is coated with a second metal that is wetted by the first metal and that is less electronegative than the first metal.

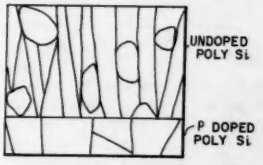
4,977,104

METHOD FOR PRODUCING A SEMICONDUCTOR DEVICE BY FILLING HOLLOWS WITH THERMALLY DECOMPOSED DOPED AND UNDOPED POLYSILICON

Kazuyuki Sawada, Moriguchi; Hisashi Ogawa, Katano; Kohsaku Yano, Osaka, and Tsutomu Fujita, Hirakata, all of Japan, assignors to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

Filed Mar. 23, 1989, Ser. No. 327,538
Claims priority, application Japan, Jun. 1, 1988, 63-134973
Int. Cl.[5] H01L *21/225, 21/385*
U.S. Cl. 437—162 2 Claims





1. A method for producing a semiconductor device comprising:

a first step of depositing a first semiconductor film doped with impurities as dopants by thermally decomposing reactive gases incorporated with at least one gas for dopants selected from a group consisting of PH_3, B_2H_6 and AsH_3 on a semiconductor substrate having hollows in a reaction chamber;

a second step of depositing a second undoped semiconductor film on said first semiconductor film to fill said hollows by thermal decomposition of said reactive gases not containing said gas for dopants without removing said semiconductor substrate out of said reaction chamber after said first step of deposition; and

a heat-treating step of diffusing dopants from said first semiconductor film to said second semiconductor film in said hollows.

4,977,105

METHOD FOR MANUFACTURING INTERCONNECTION STRUCTURE IN SEMICONDUCTOR DEVICE

Tatsuo Okamoto; Hideo Kotani; Takio Ono; Kiyoto Watabe; Yasushi Kinoshita, and Yoshikazu Nishikawa, all of Itami, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Division of Ser. No. 168,386, Mar. 15, 1988, Pat. No. 4,872,050.
This application Aug. 9, 1989, Ser. No. 391,309
Int. Cl.[5] H01L *21/60*
U.S. Cl. 437—190 4 Claims

1. A method for manufacturing an interconnection structure interconnecting conductive layers provided in a semiconductor substrate, said method comprising the process steps of:

(a) providing a first conductive layer on an upper surface of a substrate, said first conductive layer is connected to an

internal circuit formed in arbitrary region on said substrate;

(b) forming a first insulating layer on an upper surface of said first conductive layer;

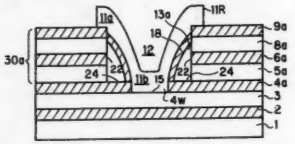
(c) providing a multi-layer structure on an upper surface of said first insulating layer, said multi-layer structure having:

second conductive layers provided in parallel to said upper surface of said substrate and connected respectively to internal circuits formed in an arbitrary region on said substrate,

at least one second insulating layer inserted between said second conductive layers for insulating said second conductive layers from each other, and

a third insulating layer provided in a top of said multi-layer structure;

(d) selectively removing said multi-layer structure to form a



recess in said multi-layer structure, said recess reaching said upper surface of said first insulating layer;

(e) forming a side wall covering a side surface of said multi-layer structure which defines a side surface of said recess, where said side wall includes an insulating film existing at least in a surface region of said side wall facing a center of said recess, and said side wall also contacts an outer part of a bottom surface of said recess which is a part of said upper surface of said first insulating layer;

(f) selectively removing a part of said first insulating layer existing under said recess to expose a contact region being a part of said first conductive layer: and

(g) forming a third conductive layer in said recess and on an upper surface of said third insulating layer, thereby to interconnect said first conductive layer and an internal circuit provided in an arbitrary region on said substrate which is connected to said third conductive layer at a place out of said recess.

4,977,106

TIN CHEMICAL VAPOR DEPOSITION USING TICL4 AND SIH4

Gregory C. Smith, Garland, Tex., assignor to Texas Instruments Incorporated, Dallas, Tex.

Filed May 1, 1990, Ser. No. 521,057
Int. Cl.[5] H01L *21/443*
U.S. Cl. 437—192 **16 Claims**

1. A method of forming a titanium nitride layer in the fabrication of a semiconductor device, comprising the steps of:

(a) providing a semiconductor device under fabrication;

(b) placing said device in a vacuum of from about 0.1 to about 10 Torr;

(c) adjusting the temperature of said device in said chamber to from about 375 to about 500 degrees C.;

(d) applying a stream of each of from about 5 to about 100 SCCM TiCl4, from about 200 to about 500 SCCM NH3 and from about 200 to about 500 SCCM of a silane having from 1 to 3 silicon atoms in said chamber for a predetermined time to form a layer of TiN over the surface of said device.

4,977,107

METHOD FOR MANUFACTURING SEMICONDUCTOR RECTIFIER

John D. Moran, Mesa, Ariz., assignor to Motorola Inc., Schaumburg, Ill.

Filed Aug. 23, 1989, Ser. No. 397,206
Int. Cl.[5] H01L *21/302*
U.S. Cl. 437—225 **12 Claims**

1. A process for forming a semiconductor device, comprising:

providing a semiconductor substrate having a principal surface of a first type;

etching a cavity into the substrate from the principal surface, wherein the cavity has a bottom;

forming a doped region of a second type opposite the first type having a first part in the principal surface and a second part in the bottom of the cavity;

covering the second part of the doped region;

removing at least a portion of the first part of the doped region around the cavity, thereby exposing a part of the substrate underneath the doped region outside the cavity; and

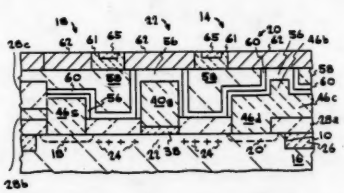
exposing the second part of the doped region.

4,977,108

METHOD OF MAKING SELF-ALIGNED, PLANARIZED CONTACTS FOR SEMICONDUCTOR DEVICES

Jacob D. Haskell, Palo Alto, Calif., assignor to Advanced Micro Devices, Inc., Calif.

Division of Ser. No. 127,733, Dec. 2, 1987, abandoned. This application Apr. 13, 1989, Ser. No. 337,995
Int. Cl.[5] H01L *21/312*
U.S. Cl. 437—229 **8 Claims**



1. A process for forming self-aligned planarized contacts, with conducting plugs formed to regions of a semiconductor device formed in a major surface of a semiconductor, suitably isolated from adjacent devices, said plugs separated by dielectric material and terminating in the plane defined by the surface of said dielectric material, said process comprising:

(a) forming a layer of resist on said surface of said conducting plugs and said dielectric material;

(b) applying an anti-contact mask to said layer of resist to leave resist where contacts to said conducting plugs are required;

(c) etching back exposed portions of said conducting plugs where no contacts thereto are required;

(d) stripping said layer of resist; and

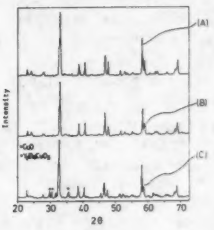
(e) filling in said etch-back areas with a planarizing material to planarize the structure.

4,977,109

PROCESS FOR THE PREPARATION OF THE PRECURSOR USED IN THE FABRICATION OF Y—BA—CU—O SUPERCONDUCTORS USING A SOLGEL TECHNIQUE

Ru-Shi Liu, Hsinchu, Taiwan, assignor to Industrial Technology Research Institute, Chutung, Taiwan

Filed Jul. 27, 1988, Ser. No. 225,062
Int. Cl.[5] C01B *13/36*; C01F *11/02, 17/00*; C01G *3/02*
U.S. Cl. 505—1 5 Claims



1. A process for the preparation of the precursor used in the fabrication of Y—Ba—Cu—O superconductor comprising:

mixing nitrates of yttrium, barium and copper in amounts to produce an atomic ratio of Y:Ba:Cu of about 1:2:3, together in oxalic acid, malonic acid or mixtures thereof and ethylene glycol;

heating the mixture in the range of 90–120 degrees centigrade to generate nitrogen oxide gasses until emission of such gas is substantially complete;

cooling the resultant mixture to an extent that a gel state is obtained;

preheating the gelled mixture to a temperature between 380 and 420 degrees centigrade until the gelled mixture is decomposed to a black substance;

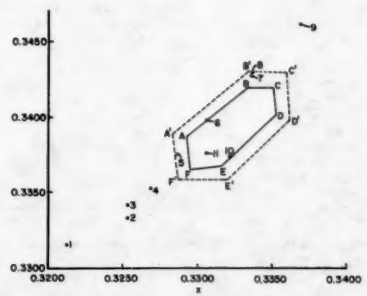
calcining the black substance at a temperature between 850 and 950 degrees centigrade in air for 10–20 hours; and pulverizing the substance obtained.

4,977,110

BEIGE-TINTED GLASS-CERAMICS

W. Duane Amundson, Jr., Caton; Heather Boek, Painted Post; George B. Hares, Corning, and Robert W. Pfitzenmaier, Canisteo, all of N.Y., assignors to Corning Incorporated, Corning, N.Y.

Filed Jan. 12, 1990, Ser. No. 464,372
Int. Cl.[5] C03C *10/12*
U.S. Cl. 501—7 2 Claims



1. A beige-tinted, opaque glass-ceramic article containing β-spodumene solid solution as the predominant crystal phase with minor amounts of rutile, spinel, loparite, and perrierite which exhibits a linear coefficient of thermal expansion (0°–300°C.) less than 15×10^{-7}/°C. and x and y color coordinates (Illuminant C) coming within polygon bounded by Points A'B'C'D'E'F'A' of the drawing, said glass-ceramic having a composition consisting essentially, expressed in terms of weight percent on the oxide basis, of

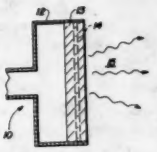
SiO_2	66–70	TiO_2	3.5–5.5
Al_2O_3	16.5–19.5	CeO_2	1.5–2.75
Li_2O	2–4	As_2O_3	0–1.5
MgO	1–5	F	0–1.2
ZnO	0.5–2	ZrO_2	0–2.5
Na_2O	0–1		

4,977,111

POROUS RADIANT BURNERS HAVING INCREASED RADIANT OUTPUT

Timothy W. Tong; Sanjeev B. Sathe, and Robert E. Peck, all of Tempe, Ariz., assignors to Arizona Board of Regents, Tempe, Ariz.

Filed Aug. 4, 1989, Ser. No. 389,542
Int. Cl.[5] C04B *35/76*
U.S. Cl. 501—95 4 Claims



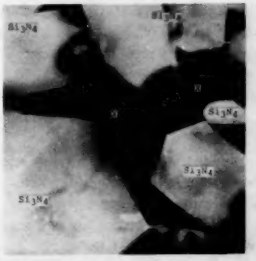
1. A porous radiant burner comprising a mold consisting of bound predried heat-cured sub-micron diameter ceramic fibers.

4,977,112

SILICON NITRIDE SINTERED BODY AND A METHOD OF PRODUCING THE SAME

Minoru Matsui, Nagoya, Japan, assignor to NGK Insulators, Ltd., Japan

Continuation of Ser. No. 158,044, Feb. 16, 1988, abandoned, which is a continuation of Ser. No. 863,733, May 16, 1986, abandoned. This application Aug. 16, 1989, Ser. No. 394,305
Claims priority, application Japan, May 20, 1985, 60-107249
Int. Cl.[5] C04B *35/58*
U.S. Cl. 501—97 12 Claims



1. A silicon nitride sintered body consisting essentially of:

Si_3N_4 in an amount of 75–95% by weight;

at least one crystallization control agent selected from the compounds of the group consisting of Mn, Co, Ni, Nb, and Mo, said crystallization control agent being present in

an amount of 0.05–3.0% by weight as MnO, CoO, NiO, Nb_2O_5 and MoO_3; and

a remainder being a sintering aid present as 2–15% by weight Y_2O_3 1–10% by weight.

wherein said crystallization control agent results in a substantially crystallized intergranular phase in said silicon nitride body, such that a bending strength of said body at about 1000° C. is substantially the same as a bending strength of said body at room temperature.

3. A silicon nitride sintered body consisting essentially of:

Si_3N_4 in an amount of 75–95% by weight;

at least one crystallization control agent selected from the compounds of the group consisting of Mn, Co, Ni, Nb, and Mo, said crystallization control agent being present in an amount of 0.05–3.0% by weight as MnO, CoO, NiO, Nb_2O_5, and MoO_3; and

a remainder being a sintering aid present as 2–15% by weight Y_2O_3, MgO, and CeO_2;

wherein said crystallization control agent results in a substantially crystallized intergranular phase in said silicon nitride body, such that a bending strength of said body at about 1000° C. is substantially the same as a bending strength of said body at room temperature.

5. A method of producing a silicon nitride sintered body comprising:

molding a blended powder of Si_3N_4 which is present in an amount of 75–95% by weight, with at least one crystallization control agent selected from compounds of the group consisting of Mn, Co, Ni, Nb, and Mo, said crystallization control agent being present in an amount of 0.05–3.0% by weight as MnO, CoO, NiO, Nb_2O_5, and MoO_3, with a remainder being a sintering aid present as 2–15% by weight Y_2O_3 and 1–10% by weight MgO;

heating said molded powder by a process selected from the group consisting of atmospheric pressure heating and pressurized heating; and

cooling said heated body at a cooling rate of not greater than 10° C./min from 1500° C.–1000° C.;

wherein said crystallization control agent results in a substantially crystallized intergranular phase in said silicon nitride sintered body, such that a bending strength of said body at about 1000° C. is substantially the same as a bending strength of said body at room temperature.

8. A method of producing a silicon nitride sintered body comprising:

molding a blended powder of Si_3N_4 which is present in an amount of 75–95% by weight, with at least one crystallization control agent selected from compounds of the group consisting of Mn, Co, Ni, Nb, and Mo, said crystallization control agent being present in an amount of 0.05–3.0% by weight as MnO, CoO, NiO, Nb_2O_5, and MoO_3, with a remainder being a sintering aid present as 2–15% by weight Y_2O_3, 1–10% by weight MgO and 1–10% by weight CeO_2;

heating said molded powder by a process selected from the group consisting of atmospheric pressure heating and pressurized heating; and

cooling said heated body at a cooling rate of not greater than 10° C./min from 1500° C.–1000° C.;

wherein said crystallization control agent results in a substantially crystallized intergranular phase in said silicon nitride sintered body, such that a bending strength of said body at about 1000° C. is substantially the same as a bending strength of said body at room temperature.

4,977,113

PROCESS FOR PRODUCING SILICON ALUMINUM OXYNITRIDE BY CARBOTHERMIC REACTION

Frankie E. Phelps, Washington Township, Westmoreland County, and Gerald W. Leech, Apollo, both of Pa., assignors to Aluminum Company of America, Pittsburgh, Pa.

Filed May 15, 1989, Ser. No. 351,660

Int. Cl.[5] C01B *33/26*; C04B *35/58*

U.S. Cl. 501—98 **21 Claims**

1. A method of carbothermically producing SiAlon which is substantially free of transition metal oxide catalyst contaminants, said method including a nitriding step, the method comprising the step of adding crystals selected from the group of SiAlon and Si_3N_4 to sources of SiO_2, Al_2O_3, and carbon prior to nitriding.

4,977,114

ZIRCONIA CERAMICS AND METHOD FOR PRODUCING SAME

Kazuo Horinouchi, and Katsuya Maeda, both of Niihama, Japan, assignors to Sumitomo Chemical Company, Limited, Osaka, Japan

Continuation-in-part of Ser. No. 228,113, Aug. 4, 1988, abandoned, which is a continuation-in-part of Ser. No. 125,683, Nov. 25, 1987, abandoned. This application Nov. 17, 1989, Ser. No. 438,946

Claims priority, application Japan, Nov. 28, 1986, 61-285599

Int. Cl.[5] C04B *35/48*

U.S. Cl. 501—104 **2 Claims**

1. Zirconia ceramics which contain 7–12 mol% of cerium oxide and 2–7 mol% of magnesium oxide and which have an average crystal grain size of 1 μm or less, at least 80 mol% of the crystal grains being tetragonal grains and the balance being monoclinic grains, and have a bending strength of at least 100 kg/mm^2, a fracture toughness of at least 10 $Mnm^{-1.5}$ and a Vickers hardness of at least 1000 kg/mm^2.

4,977,115

THIXOTROPIC REFRACTORY MATERIAL AND A PROCESS AND APPARATUS FOR LINING METALLURGICAL VESSELS WITH THIS MATERIAL BY A VIBRATION METHOD

Walter Klein, Essen, and Irmelin Wolf, Urbar, both of Fed. Rep. of Germany, assignors to Martin & Pagenstecher GMBH, Cologne, Fed. Rep. of Germany

Continuation of Ser. No. 716,898, Mar. 28, 1985. This application Aug. 29, 1986, Ser. No. 902,354

Claims priority, application Fed. Rep. of Germany, Dec. 14, 1984, 3445559

Int. Cl.[5] C04B *35/48*

U.S. Cl. 501—107 **6 Claims**

1. A refractory material based on zirconium silicate for lining metallurgical vessels by the vibration method which is free of clay and cement, and on a dry basis consists essentially of the following chemical composition

24 to 29%	SiO_2
10 to 20%	Al_2O_3
0.2 to 0.8%	P_2O_5
maximum 1.5%	$K_2O + Na_2O + LiO_2$
maximum 0.5%	Fe_2O_3
maximum 0.05%	CaO
rest	ZrO_2,

having a bulk density of at least 3.6 g/cm^3, having the following analysis (in % by weight):

20 to 30%	fused zirconium silicate/corundum
1 to 5%	alumina
0.1 to 0.5%	amorphous silica
0.3 to 1%	aluminum metaphosphate

-continued

0.5 to 4%	alkalisilicate with a molar ratio of 1:2 to 1:4
rest	zirconium silicate, and having the following particle size spectrum:
26 to 32%	0 to 0.06 mm
32 to 52%	0.06 to 0.5 mm
23 to 38%	0.5 to 3 mm,

said material in admixture with water being thixotropic and self-curing.

4,977,116

METHOD FOR MAKING LIGHTWEIGHT PROPPANT FOR OIL AND GAS WELLS

David S. Rumpf, North Tonawanda, N.Y., and Paul R. Lemieux, Fort Smith, Ark., assignors to Norton-Alcoa, Ft. Smith, Ark.

Division of Ser. No. 297,876, Jan. 17, 1989, Pat. No. 4,921,820, which is a continuation of Ser. No. 277,258, Aug. 2, 1988, abandoned. This application Feb. 21, 1990, Ser. No. 482,632

Int. Cl.[5] C04B *35/10*

U.S. Cl. 501—128 **12 Claims**

1. A method for making a low density proppant comprising the steps of:

calcining kaolin clay at a temperature below that which would cause the transformation of any significant portion of said kaolin clay to mullite or crystobalite for a time sufficient to reduce the LOI thereof to 12% or less, when tested at 1400° C.;

mixing said calcined kaolin clay with amorphous to microcrystalline silica;

pelletizing said mixture to form pellets in a selected size range; and

sintering said pellets to form proppant particles having a dry specific gravity of less than 2.70.

4,977,117

PROCESS OF PRESULFURIZING AND CONTROLLING THE ACTIVITY OF CATALYST FOR TREATING HYDROCARBONS

Georges Berrebi, Bourg Les Valence, and Pierre Dufresne, Rueil Malmaison, both of France, assignors to Europeenne De Retraitement De Catalyseurs, La Voulte Sur Rhone, France

Filed Mar. 29, 1989, Ser. No. 330,255

Claims priority, application France, Mar. 29, 1988, 88 04253

Int. Cl.[5] B01J *23/94, 23/92, 37/20*; C10G *45/08*

U.S. Cl. 502—26 **15 Claims**

1. In a process for regenerating a catalyst, said catalyst comprising:

(a) a support containing at least one oxide of a metal or metalloid and

(b) at least one Ni or Mo metal, said catalyst having been deactivated in a hydrocarbon refining reaction,

said process comprising in a first stage treating said catalyst in the absence of hydrogen with at least one sulfurizing agent comprising a polysulfide of the formula

$$R—S_{(n)}—R'$$

wherein n is 2 to 20, R is a hydrocarbon organic radical of 1–150 carbon atoms per molecule and R' is independently a radical as defined for R or a hydrocarbon atom, R and R' being selected from the group consisting of saturated or unsaturated, linear or branched alkyl radicals, naphthenic radicals, aryl radicals, alkylaryl radicals, and arylalkyl radicals, whereby said agent is incorporated at least in part in said catalyst,

in a first portion of a second stage, treating the catalyst in the absence of hydrogen and in the presence of steam, moist air or moist inert gas, at a temperature up to 275° C., and, in a second portion of the second stage, treating the catalyst in the presence of hydrogen at a temperature of at least 275° C.

the improvement comprising conducting the first stage in the presence of at least one arylamine compound capable of supplying ammonia to the regeneration, wherein the arylamine compound is added in an amount such that an amount of molecular nitrogen of about 0.1–10% by weight of the polysulfide is added.

4,977,118

METHOD FOR REGENERATION OF CATALYST FOR PRODUCING OF AZIRIDINE COMPOUNDS

Hideaki Tsuneki, Tokyo; Kimio Ariyoshi; Atusi Moriya, both of Suita, and Michio Ueshima, Takarazuka, all of Japan, assignors to Nippon Shokubai Kagaku Kogyo Co., Ltd., Osaka, Japan

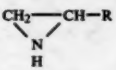
Filed Feb. 27, 1990, Ser. No. 485,542

Claims priority, application Japan, Feb. 27, 1989, 64-43331

Int. Cl.[5] B01J *27/28, 38/42, 38/04*; C07D *203/04*

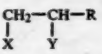
U.S. Cl. 502—35 **9 Claims**

1. A method for regeneration of catalyst which comprises phosphorus and alkali metal element and/or alkaline earth metal element and was deteriorated by use to produce aziridine compound represented by the general formula



(II)

wherein R is hydrogen, a methyl group or an ethyl group, by a catalytic vapor-phase intramolecular dehydration reaction of alkanolamine represented by the general formula



(I)

wherein R is as defined in the formula (II), X is OH or NH_2, and Y is either NH_2 when X is OH or OH when X is NH_2, characterized in that the deteriorated catalyst is contacted with gaseous volatile phosphorus compound.

4,977,119

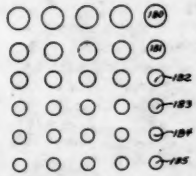
METHOD OF REGENERATING HYDROCARBON CONVERSION CATALYST BY COKE BURNING

William J. Koves, Hoffman Estates, Ill., assignor to UOP, Des Plaines, Ill.

Division of Ser. No. 116,932, Nov. 4, 1987, Pat. No. 4,880,604. This application Nov. 16, 1989, Ser. No. 437,233

Int. Cl.[5] B01J *38/24, 27/32, 23/96*; C10G *35/12*

U.S. Cl. 502—48 **10 Claims**



1. A method for effecting at least partial regeneration of spent catalyst particles used in hydrocarbon conversion reactions by removing coke deposits on said spent catalyst, said method comprising:

(a) passing spent catalyst particles into the top of a vertically-elongated bed of catalyst particles, said bed having a uniform thickness and said catalyst particles being confined to form said bed by gas permeable sidewalls;

(b) withdrawing catalyst particles from the bottom of the catalyst bed, thereby causing catalyst particles to move downward by gravity;

(c) maintaining the bed of catalyst particles at coke-oxidizing temperatures; and,

(d) combusting coke in said bed by passing an oxygen-containing gas through the catalyst bed in a direction substantially transverse to catalyst flow and in a non-uniform manner such that substantially all of the catalyst in the bed is in contact with flowing gas and the gas flow rate through the bed varies from a maximum at the top of the bed to a minimum at the bottom of the bed.

4,977,120

BINDERLESS ZEOLITE CATALYSTS, PRODUCTION THEREOF AND CATALYTIC REACTION THEREWITH

Satoshi Sakurada; Nobuaki Tagaya; Tadashi Miura; Tsugio Maeshima, and Takao Hashimoto, all of Saitama, Japan, assignors to Toa Nenryo Kogyo K.K., Tokyo, Japan

Continuation of Ser. No. 674,910, Apr. 9, 1984, abandoned. This application Apr. 13, 1988, Ser. No. 181,124

Int. Cl.[5] B01J 29/06; C10B 33/28

U.S. Cl. 502—64 3 Claims

1. A process for producing a binderless zeolite catalyst which is a molded body consisting essentially of TSZ crystalline aluminosilicate, by carrying out a hydrothermal treatment of a solid prepared by molding a mixture obtained by mixing 30 to 70 weight % of at least one member selected from the group consisting of a silica/alumina xerogel, a hydrothermally treated silica/alumina xerogel and mixtures thereof with 70 to 30 weight % of a silica/alumina gel having an SiO_2/Al_2O_3 ratio essentially equal to that of TSZ crystalline aluminosilicate, wherein said hydrothermal treatment is carried out in an aqueous solution in the presence of a neutral sodium salt mineralizer in a concentration ranging from 1.5 weight % to the solubility limit until the aluminosilicate content reaches essentially 100%.

3. A process of claim 1 wherein said molding is carried out to produce pellets, polylobal bodies, or hollow tubes.

4,977,121

MORDENITE-CONTAINING CATALYST, ITS PREPARATION AND USE FOR ISOMERIZING CUTS OF HIGH NORMAL PARAFFIN CONTENT

Pierre Dufresne, Rueil-Malmaison; Jean-Pierre Franck, Bougival; François Raatz, and Christine Travers, both of Rueil-Malmaison, all of France, assignors to Institut Francais du Petrole, Rueil-Malmaison, France

Filed Jan. 22, 1987, Ser. No. 5,806

Claims priority, application France, Jan. 22, 1986, 86 00992

Int. Cl.[5] B01J 29/20

U.S. Cl. 502—66 6 Claims

1. A catalyst containing by weight:

(a) from 10 to 99.99% of a mordenite adsorbing molecules of a kinetic diameter larger than about 6.6×10^{-10} m, having a Si/Al atomic ratio from about 5 to 50, a sodium content by weight lower than 0.2% of the total weight of dry mordenite, a volume V of a unit cell from 2.73 to 2.78 cubic nanometers, a benzene adsorption capacity of more than 5% by weight with respect to the dry mordenite weight, said mordenite being in major part shaped as needles,

(b) from 0 to 89.99% of a matrix selected from the group consisting of alumina, silica, magnesia, zirconia, natural clays or mixtures thereof,

(c) from 0.005 to 15% of at least one metal from group VIII of the periodic classification of elements, and

(d) from 0.005 to 10% of at least one metal from group IVA of the periodic classification, selected from the group consisting of tin, germanium and lead.

4,977,122

CRACKING CATALYST

Paul E. Eberly, Baton Rouge, La., assignor to Exxon Research and Engineering Company, Florham Park, N.J.

Filed Jun. 5, 1989, Ser. No. 361,892

Int. Cl.[5] B01J 29/06

U.S. Cl. 502—69 11 Claims

1. A catalyst comprising: (a) a crystalline metallosilicate zeolite; (b) a non-zeolitic inorganic oxide matrix, said zeolite being dispersed in said matrix, and (c) discrete particles of phosphorus-containing alumina also dispersed in said matrix, said discrete particles having been prepared by contacting alumina having a BET surface area greater then 20 square meters per gram with a phosphorus compound selected from the group consisting of an alkaline earth metal salt of phosphoric acid or phosphorous acid and mixtures thereof, for a time sufficient to incorporate an effective amount of phosphorus in said alumina.

4,977,123

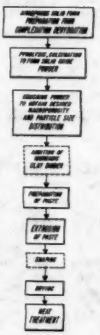
PREPARATION OF EXTRUSIONS OF BULK MIXED OXIDE COMPOUNDS WITH HIGH MACROPOROSITY AND MECHANICAL STRENGTH

Maria Flytzani-Stephanopoulos, Winchester, Mass., and Kandaswami Jothimurugesan, Baton Rouge, La., assignors to Massachusetts Institute of Technology, Cambridge, Mass.

Filed Jun. 17, 1988, Ser. No. 208,378

Int. Cl.[5] B01J 21/16, 20/12, 23/72, 21/06

U.S. Cl. 502—84 16 Claims



1. A method of preparing bodies of bulk metal oxide-based solid catalysts and absorbents having controllable surface area greater than 5 m^2/g, macroporosity, high pore volume and, comprising the steps of:

a compressive crush strength in the range of approximately 1–10 lb/mm.;

preparing a citrate precursor having, in desired proportions, metals selected from the group consisting of aluminum, zinc, transition metals, alkali metals, alkaline earth elements, rare earth elements and mixtures thereof;

calcining the citrate precursor at a temperature ranging between 550° C.–850° C. for approximately 4–8 hours to yield a highly dispersed and macroporous metal oxide solid;

treating the metal oxide solid by crushing and sizing to yield a highly dispersed, macroporous powder having a continuous particle size distribution such that fine and coarse size particles are retained, and macropores, in the size range of 0.1 μm to 25 μm in diameter, comprise a least 60% of the total pore volume of the powder and the remaining pores have a diameter less than 0.1 μm;

adding about 2–7 percent by weight of a clay binder material to the powder;

forming solid bodies from the powder;

shaping the bodies to an appropriate size and shape;

drying the bodies in air at 100° C.–120° C. for approximately 16 hours; and

heat treating the bodies for approximately 2–6 hours at a temperature in the range of approximately 650° C.–850° C.

11. The product produced by the method of claim 1.

4,977,124

CATALYST COMPOSITION FOR COUPLING PROCESS

R. Scott Smith, Baton Rouge, La., assignor to Ethyl Corporation, Richmond, Va.

Filed Jun. 30, 1989, Ser. No. 374,043

Int. Cl.[5] B01J 23/02, 27/232

U.S. Cl. 502—174 9 Claims

1. A catalyst composition prepared by dispersing potassium or a sodium potassium alloy onto a supported oxide of sodium, potassium, rubidium, cesium, barium, strontium, calcium, or magnesium in the absence of a diluent.

4,977,125

PROCESS FOR THE PREPARATION OF SILICON OXYNITRIDE-CONTAINING PRODUCTS

Peter W. Lednor, Amsterdam, Netherlands, assignor to Shell Oil Company, Houston, Tex.

Division of Ser. No. 190,911, May 4, 1988, Pat. No. 4,888,159.

This application Sep. 27, 1989, Ser. No. 413,147

Claims priority, application Netherlands, May 6, 1987, 8701065

Int. Cl.[5] B01J 27/14, 21/08

U.S. Cl. 502—200 5 Claims

5. A catalyst carrier comprising silicon oxynitride-containing materials obtained by a process which comprises reacting an amorphous, non-porous silicon dioxide material with flowing, ammonia-containing gas at a temperature in the range of from about 950° C. to about 1300° C.

4,977,126

PROCESS FOR THE PREPARATION OF SURFACE IMPREGNATED DISPERSED COBALT METAL CATALYSTS

Charles H. Mauldin, and Kenneth L. Riley, both of Baton Rouge, La., assignors to Exxon Research and Engineering Company, Florham Park, N.J.

Continuation-in-part of Ser. No. 72,517, Jul. 13, 1987, abandoned, which is a continuation-in-part of Ser. No. 46,649, May 7, 1987, abandoned. This application Nov. 14, 1988, Ser. No. 270,596

Int. Cl.[5] B01J 21/06, 21/12, 23/74; C07C 27/06

U.S. Cl. 502—242 13 Claims

1. In a process for the production of catalysts wherein a catalytically effective amount of cobalt is impregnated and dispersed on the outer surface of a particulate porous inorganic oxide support to form a catalyst useful for the conversion of synthesis gas to hydro-carbons, and the support particles are contacted with a spray containing a decomposable compound of cobalt,

the improvement comprising

maintaining a bed of the support particles in a fluidized state at temperature ranging from about 50° C. to about 100° C. by contact with a gas at temperature ranging from about 50° C. to about 100° C.,

spraying the bed of the heated support particles with a liquid in which a cobalt compound is dispersed at flow rate sufficient to provide a ratio between the flow rate of the liquid: flow rate of the fluidizing gas below about 0.6 grams liquid/ft^3 of fluidizing gas to form on the particles a surface layer of cobalt compound in average thickness ranging from about 20 microns to about 250 microns, with the loading of cobalt compound ranging from about 0.01 g/cc to about 0.15 g/cc, calculated as metallic cobalt per packed bulk volume of catalyst.

4,977,127

CATALYST FOR DENITRIZING NITROGEN OXIDES CONTAINED IN WASTE GASES

Hiroaki Rikimaru; Tadao Nakatsuji; Toshikatsu Umaba; Kazuhiko Nagano; Kazuya Mishina, and Hiromitsu Shimizu, all of Sakai, Japan, assignors to Sakai Chemical Industry Co., Ltd., Osaka and Mitsubishi Jukogyo Kabushiki Kaisha, Tokyo, both of, Japan

Continuation of Ser. No. 95,823, Sep. 14, 1987, abandoned. This application Aug. 7, 1989, Ser. No. 393,071

Claims priority, application Japan, Sep. 13, 1986, 61-216355; Sep. 30, 1986, 61-234031

Int. Cl.[5] B01J 21/06, 23/22, 23/30

U.S. Cl. 502—309 5 Claims

1. A catalyst for denitrizing nitrogen oxides contained in waste gases, which comprises: titanium and vanadium therein in weight ratios of oxides of titanium to oxides of vanadium ranging from 99.9:0.1 to 92.0:8.0, the vanadium being concentratedly contained in the surface layer of the catalyst up to 200 μm in depth from the surface of the catalyst in concentrations of at least about 1.5 times as much as the concentrations of vanadium throughout the catalyst, and the catalyst having micropores of about not less than about 50 Å in amounts of 0.25–0.40 ml/g, and micropores of about 50–100 Å in radius in amounts of about 10–40% by volume and micropores of about 1000–60,000 Å in radius in amounts of not less than about 10% by volume, respectively, based on the total volume of the micropores of not less than about 50 Å in radius.

4,977,128

CATALYST FOR COMBUSTION AND PROCESS FOR PRODUCING SAME

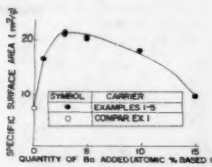
Yasuyoshi Kato; Nobue Teshima, both of Kure; Masao Ohta, Hiroshima, and Kunihiko Konishi, Kure, all of Japan, assignors to Babcock-Hitachi Kabushiki Kaisha, Japan

Filed Dec. 29, 1987, Ser. No. 138,605

The portion of the term of this patent subsequent to Dec. 8, 2004, has been disclaimed.

Int. Cl.[5] 502 332, 334

U.S. Cl. 502—328 10 Claims



1. A catalyst for combustion comprising a compound expressed by a composition formula of $BaAl_{12}O_{19}$ having Pt or Rh supported thereon.

4,977,129

AUTO EXHAUST CATALYST COMPOSITION HAVING LOW H_2S EMISSIONS AND METHOD OF MAKING THE CATALYST

Michael V. Ernest, Baltimore, Md., assignor to W. R Grace & Co.-Conn., New York, N.Y.

Filed Mar. 13, 1989, Ser. No. 322,444

Int. Cl.[5] B01J 21/06, 21/08, 23/58, 23/60

U.S. Cl. 502—330 24 Claims

1. A catalyst suitable for use as a three-way catalyst having low H_2S emissions for emission control with no substantial amount of ceria or nickel present comprising a formed refractory oxide particle or refractory oxide powder support having a B.E.T. surface area of 50–250 m^{2}g and having directly deposited thereon about 0.5–20% by weight of a non-rare earth oxide stabilizer selected from the group consisting of ZrO_2,

MgO, CaO, SrO, BaO, Y_2O_3, ZnO, B_2O_3, P_2O_5, SiO_2 and mixtures thereof; at least about 0.5 to about 5% by weight of an alkali metal oxide as a promoter; and having subsequently deposited thereon a catalytically-effective amount of one or more platinum group metals selected from the group of Pt, Pd, Ir, Rh, or mixtures thereof; binary mixtures of Pt-Pd, Pt-Rh, or Pd-Rh; and tertiary mixtures of Pt-Pd-Rh.

4,977,130

COMPOSITIONS INVOLVING V_2O_3-AL_2O_3-TIO_2

Nitri S. Najjar, Wappingers Falls, N.Y., and Arnulf Muan, Lacey Spring, Va., assignors to Texaco Inc., White Plains, N.Y.

Filed Sep. 5, 1989, Ser. No. 402,714
Int. Cl.[5] B01J *21/04, 23/22*
U.S. Cl. 502—351 **14 Claims**

1. A composition involving V_2O_3, Al_2O_3 and TiO_2 wherein said composition is depicted by the shaded area circumscribed by AFEDCB as shown in the disclosed figure wherein the amounts of V_2O_3, Al_2O_3 and TiO_2 are characterized as shown in the table below:

Vertices	Coordinates (Wt %)		
	V_2O_3	Al_2O_3	TiO_2
A	65	0	35
B	0	56	44
C	15	45	40
D	28	37	35
E	53	22	25
F	94	0	6.

4,977,131

OCR SCANNABLE CARBONLESS COPYING SYSTEM AND A METHOD OF PRODUCING OCR SCANNABLE IMAGES THEREWITH

Norman Macaulay, Tonawanda, N.Y., assignor to Moore Business Forms, Inc., Grand Island, N.Y.

Continuation-in-part of Ser. No. 198,070, May 24, 1988. This application Dec. 21, 1988, Ser. No. 287,060
The portion of the term of this patent subsequent to Jul. 24, 2007, has been disclaimed.
Int. Cl.[5] B41M *5/22*
U.S. Cl. 503—201 **18 Claims**

12. A method of producing copying images capable of detection by an optical character recognition device comprising:

applying to a recording substrate a first image-forming component;

applying to a transfer substrate a microencapsulated first complementary image-forming component capable of forming a colored chemical reaction product with said first image-forming component;

applying to selected portions of said transfer substrate a microencapsulated second complementary image-forming component capable of forming a colored chemical reaction product detectable by an optical character recognition device;

positioning said recording substrate and said transfer substrate whereby said first image-forming component is in juxtaposed contact with said first and second complementary image-forming components; and

applying pressure to selected locations of said transfer substrate to rupture the microcapsules of at least one of said first and second complementary image-forming components whereby said component comes into contact with said first image-forming component on said recording substrate to form a colored chemical reaction product thereon.

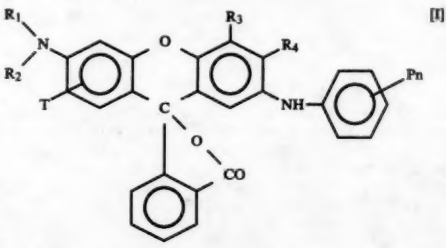
4,977,132

HEAT-SENSITIVE RECORD MATERIAL

Tetsuo Tsuchida, Takarazuka; Tatsuya Meguro, Nishinomiya; Fumio Seyama, Osaka, and Mitsuru Kondo, Hyogo, all of Japan, assignors to Kanzaki Paper Manufacturing Co., Ltd., Tokyo, Japan

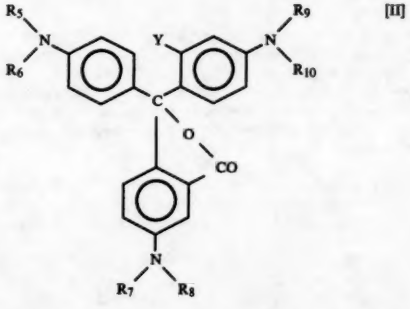
Filed Jun. 22, 1989, Ser. No. 370,267
Claims priority, application Japan, Jun. 29, 1988, 63-163080
Int. Cl.[5] B41M *5/18*
U.S. Cl. 503—220 **8 Claims**

1. A heat-sensitive record material having a heat-sensitive record layer on a base sheet which comprises a colorless or pale colored basic chromogenic material and a phenolic compound which develops a color by contacting with the chromogenic material, characterized in comprising as the basic chromogenic material at least one fluoran derivative represented by the following formula [I] and at least one phthalide derivative represented by the following formula [II] in a weight ratio of 100:2–18



[I]

wherein each R_1, R_2 represents alkyl, unsaturated alkyl, cycloalkyl, aryl, aralkyl or tetrahydrofurfuryl, each of which have at least one substituent selected from the group consisting of halogen, alkyl and alkoxy, R_1 may cooperate with R_2 to form a ring, each R_3, R_4 represents hydrogen, alkyl, halogen or alkoxyl, P represents hydrogen, halogen, alkyl, alkoxyl, halogenated alkyl, alkoxycarbonyl or dialkylamino, T represents hydrogen, alkyl or halogen, and n represents an integer of 1 to 4;



[II]

wherein each R_5–R_{10} represents hydrogen, C_1–C_6 alkyl, C_3–C_6 unsaturated alkyl, C_5–C_6 cycloalkyl, phenyl, C_7–C_9 aralkyl or tetrahydrofurfuryl, each of which may have at least one substituent selected from the group consisting of halogen, C_1–C_2 alkyl and C_1–C_3 alkoxyl, each pair of R_5 and R_6, R_7 and R_8, and R_9 and R_{10} may cooperate to form pyrrolidino ring,

piperidino ring, morpholino ring or hexamethylencimino or C_2–C_3 acyloxy.

4,977,133

HEAT SENSITIVE RECORDING MATERIAL

Kouichi Ishida, Amagasaki; Mikio Nakamura, Nishinomiya, and Yukio Takayama, Toyonaka, all of Japan, assignors to Kanzaki Paper Manufacturing Co., Ltd., Tokyo, Japan

Filed Jan. 27, 1989, Ser. No. 302,637
Claims priority, application Japan, Jan. 30, 1988, 63-20217
Int. Cl.[5] B41M 5/18
U.S. Cl. 503—226 9 Claims

1. A heat sensitive recording material comprising a substrate, a heat sensitive recording layer thereon, containing a colorless or light-colored basic dye and a color acceptor which is reactive with the dye to form a color when contacted therewith, and a coating, containing a dried emulsion comprising complex particles of colloidal silica and at least one acrylic polymer disposed over said recording material.

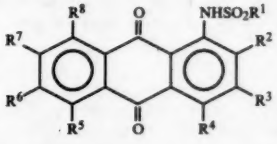
4,977,134

THERMAL TRANSFER IMAGING USING SULFONYLAMINOANTHRAQUINONE DYES

Susan K. Jongewaard; Terrance P. Smith; Louis M. Leichter, and Krzysztof A. Zaklika, all of St. Paul, Minn., assignors to Minnesota Mining and Manufacturing Company, St. Paul, Minn.

Filed Jul. 21, 1989, Ser. No. 384,158
Int. Cl.[5] B41M 5/035, 5/26
U.S. Cl. 503—227 15 Claims

1. A thermal dye transfer imaging element comprising a continuous layer of at least one anthraquinone dye in a polymeric binder, said dye comprising up to 99% by weight of the total weight of dye and binder, said continuous layer being bonded to a substrate said dye having the general structure:



where R^1 is selected from R^9,

R^9 alkyl of 1 to 20 carbon atoms, or alkyl of 1 to 20 carbon atoms substituted with one or more of fluoro, chloro, bromo, hydroxy, amino, and alkoxy, alkythio, and monoalkylamino and dialkylamino each with alkyl groups of 1 to 10 carbon atoms,

R^{10} is aryl of 5 to 20 carbon atoms, or aryl of 5 to 20 carbon atoms substituted with one or more of R^9, fluoro, chloro, bromo, nitro, sulfonyl, cyano, carbonyl, hydroxy, amino, and R^9O—, R^9S—, R^9NH—, and R^9R^9N—, R^2 to R^8 are independently selected from hydrogen, fluoro, chloro, bromo, nitro, cyano, $R^{12}SO_2NH$—, $R^{11}NH$—, $R^{11}O$—, $R^{11}S$—, $R^{11}(CO)O$—, $R^{11}(CO)NH$—, $R^{11}CO$—, $R^9O(CO)$—, $R^{10}O(CO)$—, $R^{11}R^{11}N(CO)$—, $R^{11}SO_2$—, and $R^{11}R^{11}NSO_2$—,

and groups R^{11} are independently selected from hydrogen, R^9 and R^{10}, and R^{12} is independently selected from R^9 and R^{10}.

4,977,135

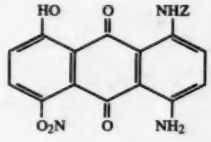
THERMAL TRANSFER PRINTING

Roy Bradbury, Cheshire; Peter A. Gemmell, Ipswich, and Richard A. Hann, Cheshire, all of England, assignors to Imperial Chemical Industries PLC, London, England

Filed Jul. 14, 1989, Ser. No. 380,127
Claims priority, application United Kingdom, Jul. 20, 1988, 8817219
Int. Cl.[5] B41M 5/035, 5/26
U.S. Cl. 503—227 19 Claims

1. A thermal transfer printing sheet comprising:

a substrate having a coating comprising a binder and an anthraquinone dye of Formula I:



I

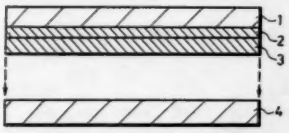
wherein Z is hydrogen or an optionally substituted alkyl radical, optionally substituted cycloalkyl radical or an optionally substituted aryl radical.

4,977,136

COVER FILM FOR HARD COPY PRINTING PAPER

Yoshio Fujiwara; Naotake Kobayashi; Satoru Shinohara, and Tetsuya Abe, all of Kanuma, Japan, assignors to Sony Corporation, Tokyo, Japan

Continuation of Ser. No. 130,944, Dec. 10, 1987, abandoned, which is a continuation of Ser. No. 817,737, Nov. 29, 1985, abandoned. This application Oct. 4, 1989, Ser. No. 406,196
Claims priority, application Japan, Mar. 29, 1984, 59-61853
Int. Cl.[5] B41M 5/035, 5/26
U.S. Cl. 503—227 3 Claims



1. A print comprising a substrate having a visual image formed of sublimation dye on a surface thereof, and a transparent protective cover sheet over said image through a hot-meltable resinous layer provided between said substrate and said protective cover sheet, said protective cover sheet including a layer formed of a material having a glass transition temperature greater than 70° C. and a water absorbing ratio (ASTM D570) of less than 2%, said protective cover film preventing movement of said sublimation dye through said protective cover sheet.

4,977,137

LACTOFERRIN AS A DIETARY INGREDIENT PROMOTING THE GROWTH OF THE GASTROINTESTINAL TRACT

Buford L. Nichols, and Kathryn S. McKee, both of Houston, Tex., assignors to Baylor College of Medicine, Houston, Tex.

Filed Jun. 3, 1987, Ser. No. 57,562
Int. Cl.[5] A61K 37/14, 37/02; A23L 1/305
U.S. Cl. 514—6 27 Claims

1. An infant formula containing a pharmacological amount of milk lactoferrin as a sole growth promoter sufficient to promote gastrointestinal tract growth in human infants and infant animals.

4,977,138

FR901228 SUBSTANCE AND PREPARATION THEREOF

Masakuni Okuhara; Toshio Goto; Yasuhiro Hori, all of Tsukuba; Takashi Fujita, Tsuchiura; Hirotsugu Ueda, and Nobuharu Shigematsu, both of Tsukuba, all of Japan, assignors to Fujisawa Pharmaceutical Co., Ltd., Osaka, Japan

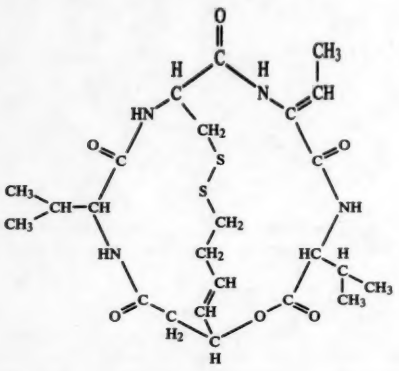
Filed Jul. 6, 1989, Ser. No. 375,998

Claims priority, application United Kingdom, Jul. 26, 1988, 8817743

Int. Cl.[5] A61K *37/02*; C07K *7/54*

U.S. Cl. 514—10 2 Claims

1. FR901228 substance of the following formula,



4,977,139

AQUEOUS ELCATONIN SOLUTION COMPOSITION

Hitoshi Yamada; Ken Endo, and Kikuo Kotani, all of Shizuoka, Japan, assignors to Toyo Jozo Company, Ltd., Shizuoka, Japan

Filed Oct. 25, 1989, Ser. No. 427,597

Claims priority, application Japan, Dec. 23, 1988, 63-324999

Int. Cl.[5] A61K *37/00*

U.S. Cl. 514—11 5 Claims

1. An aqueous elcatonin solution composition which contains an effective amount of elcatonin as an active ingredient and at least one compound selected from the group consisting of at least one of acetic acid, lactic acid, L-histidine and water soluble salts thereof in a molar concentration within the range of from 0.05 to 20 mmol and which has a pH within the range of from 5.0 to 6.5 and an ionic strength within the range of from 0.01 to 0.3, said composition being stabilized against shaking.

4,977,140

INJECTABLE SUSTAINED RELEASE FORMULATION

Thomas H. Ferguson, Greenfield; Roger G. Harrison, Zionsville, and David L. Moore, Indianapolis, all of Ind., assignors to Eli Lilly and Company, Indianapolis, Ind.

Continuation of Ser. No. 768,605, Aug. 23, 1985, abandoned. This application Mar. 23, 1989, Ser. No. 327,861

Int. Cl.[5] A61K *37/36*; C07K *13/00*

U.S. Cl. 514—12 7 Claims

1. A method for obtaining 28 days of increased daily milk production from a dairy cow which comprises injecting the cow with 2 to 10 grams of a formulation comprising 10–25% bovine somatotropin suspended in a carrier that comprises 8–20% of a wax and 80–92% of an oil.

4,977,141

PEPTIDYL α-AMINOACYL AMINODIOL CARBAMATES AS ANTI-HYPERTENSIVE AGENTS

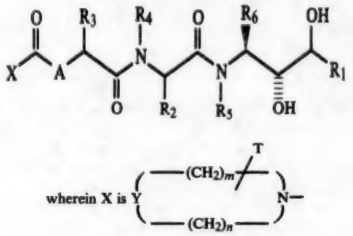
Gunnar J. Hanson, Skokie, and John S. Baran, Winnetaka, both of Ill., assignors to G. D. Searle & Co., Chicago, Ill.

Filed Oct. 1, 1987, Ser. No. 103,625

Int. Cl.[5] A61K *37/02, 37/00, 31/415*; C07K *5/00*

U.S. Cl. 514—19 12 Claims

9. A therapeutic method for treating hypertension, said method comprising administering to a hypertensive patient a therapeutically-effective amount of a compound of the formula:



wherein X is

wherein Y is O; m is 2; n is 2; T is one or more of H or methyl; R_1 is selected from H, methyl, ethyl and isobutyl; R_2 is isobutyl; R_3 is selected from benzyl and napthylmethyl; R_4 is H or methyl; R_5 is H or methyl; and R_6 is cyclohexylmethyl; A is O or S or a pharmacologically-acceptable salt thereof.

4,977,142

ANTIALLERGENIC AGENT

Wesley F. Green, Valley Heights, Australia, assignor to University of Sydney, Sydney, Australia

Continuation of Ser. No. 921,911, Oct. 22, 1986, Pat. No. 4,806,526, which is a continuation of Ser. No. 753,215, Jul. 9, 1985, abandoned. This application Nov. 3, 1988, Ser. No. 266,750

Claims priority, application Australia, Jul. 11, 1984, PG5962

The portion of the term of this patent subsequent to Feb. 21, 2006, has been disclaimed.

Int. Cl.[5] A01N *43/04*

U.S. Cl. 514—23 3 Claims

1. A method of removing allergens from an environment which comprises treating said environment with an antiallergenically effective amount of tannic acid, wherein the allergens are selected from the group consisting of *D. farinae* and *D. Pteronyssinus.*

4,977,143

ANTIBACTERIAL AND ANTITUMOR AGENTS LL-E33288EPSILON-I AND LL-E33288EPSILON-BR

William J. McGahren, Demarest, N.J., and George A. Ellestad, Pearl River, N.Y., assignors to American Cyanamid Company, Stamford, Conn.

Filed Feb. 29, 1988, Ser. No. 161,627

Int. Cl.[5] A61K *31/71*; C12P *19/26*; C07H *5/00*

U.S. Cl. 514—25 10 Claims

1. The compound LL-E33288ε-I, having:

(a) a molecular formula: $C_{54}H_{74}N_3O_{21}IS_2$;

(b) an elemental analysis: C, 48.37; H, 5.72; N, 3.04; S, 4.98 and I, 9.28;

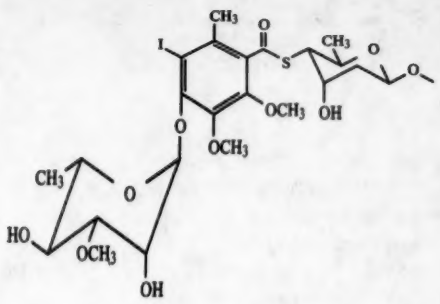
(c) an optical rotation $[\alpha]_D^{25} = -14 \pm 1°$ (C, 1.115%, methanol);

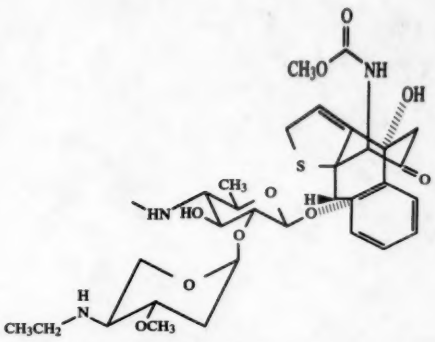
(d) an optical density: 0.23 at 10μg/ml in methanol at 230 nm;

(e) a proton magnetic resonance spectrum as shown in FIG. I of the drawings;

(f) a carbon-13 magnetic resonance spectrum: as shown in FIG. II of the drawings; and

(g) The structure:





4,977,144

IMIDAZO[4,5-b]PYRIDINE DERIVATIVES AS CARDIOVASCULAR AGENTS

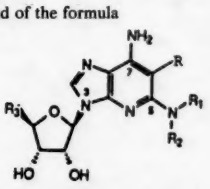
Roger A. Fujimoto, West Orange; John E. Francis, Basking Ridge, both of N.J., and Alan J. Hutchison, Madison, Conn., assignors to Ciba-Geigy Corporation, Ardsley, N.Y.

Continuation-in-part of Ser. No. 229,684, Aug. 2, 1988, abandoned. This application Sep. 12, 1989, Ser. No. 405,926

Int. Cl.[5] **A61K** *31/70, 31/44;* **C07H** *17/00;* **C07D** *401/00*

U.S. Cl. 514—46 **24 Claims**

1. A compound of the formula



(I)

wherein R represents hydrogen, lower alkyl, carbocyclic aryl or carbocyclic aryl-lower alkyl; R_1 represents hydrogen, lower alkyl, C_3-C_7-alkenyl, carbocyclic or heterocyclic aryl, carbocyclic or heterocyclic aryl-lower alkyl, C_3-C_7-cycloalkyl, or optionally lower alkyl substituted (C_3-C_7-cycloalkyl, bicycloheptyl, bicycloheptenyl, adamantly, tetrahydropyranyl or tetrahydrothiopyranyl)-lower alkyl, or diaryl-lower alkyl; R_2 represents hydrogen or lower alkyl; R_3 represents hydroxymethyl or —$CONHR_4$ in which R_4 represents hydrogen, lower alkyl, aryl-lower alkyl, C_3-C_7-cycloalkyl, C_3-C_7-cycloalkyl-lower alkyl or hydroxy-lower alkyl; a pharmaceutically acceptable ester derivative thereof in which one or more of the hydroxy groups are esterified in form of a pharmaceutically acceptable ester; or a pharmaceutically acceptable salt thereof.

4,977,145

METHOD FOR PREVENTING OR TREATING DEPRESSION EMPLOYING AN ACE INHIBITOR

Abraham Sudilovsky, Lawrenceville, N.J., assignor to E. R. Squibb & Sons, Inc., Princeton, N.J.

Division of Ser. No. 371,161, Jun. 26, 1989, Pat. No. 4,912,096. This application Dec. 11, 1989, Ser. No. 448,412

Int. Cl.[5] **A61K** *31/41, 31/54, 31/55, 31/135*

U.S. Cl. 514—91 **7 Claims**

1. A method for inhibiting onset of or treating depression in a mammalian specie, which comprises administering to a mammalian specie in need of such treatment an antidepressive effective amount of an angiotensin converting enzyme inhibitor which is (S)-1-[6-amino-2-[[hydroxy(4-phenylbutyl)phosphinyl]oxy]-1-oxo-hexyl]-L-proline, fosinopril or zofenopril or pharmaceutically acceptable salts thereof and an effective amount of an antidepressant drug which is lithium, doxepin HCl, amitriptyline HCl, amoxapine, trazodone HCl, perphenazine, chlordiazepoxide, isocaboxazid, maprotiline HCl, phenelzine sulfate, desipramine HCl, nortriptyline HCl, tranylcypromine sulfate, trimipramine maleate, imipramine HCl, or protriptyline HCl, or mixtures of one or more thereof.

4,977,146

2,5-DIARYL TETRAHYDROFURANS AND ANALOGS THEREOF AS PAF ANTAGONISTS

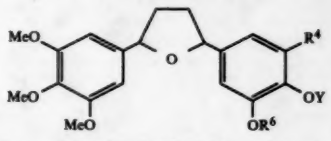
Tesfaye Biftu, Parlin; Mitree M. Ponpipom, Branchburg, and Nirindar N. Girotra, Old Bridge, all of N.J., assignors to Merck & Co., Inc., Rahway, N.J.

Continuation-in-part of Ser. No. 362,920, Jun. 8, 1989, abandoned. This application Apr. 11, 1990, Ser. No. 505,712

Int. Cl.[5] **C07D** *307/12, 307/14*

U.S. Cl. 514—99 **30 Claims**

1. A compound of the following structural formula



or a pharmaceutically acceptable salt thereof wherein:

R^4 is $S(O)_n$ R^2, in which n is 0, 1 or 2, and

R^2 is selected from the group consisting of

(a) C_{2-6}alkyl,

(b) Substituted C_{1-6}alkyl wherein the substituent is selected from the group consisting of hydroxy, amino, N—C_{1-4}alkylamino, and N,N-di-C_{1-4}alkylamino, and

(c) C_{1-6}alkylcarbonyl-C_{1-6}alkyl;

Y is selected from the group consisting of

(a) C_{1-12}alkyl

(b) C_{1-6}hydroxyalkyl,

(c) C_{1-6}alkylcarbonyl C_{1-6}alkyl, and

(d) unsubstituted, mono, or di substituted amino C_{1-6}alkyl where the substituent is C_{1-6}alkyl;

R^6 is selected from the group consisting of

(a) substituted C_{1-6}alkyl wherein the substituent is selected from the group consisting of hydroxy, amino, N-C_{1-4}alkylamino, N,N-di-C_{1-4} alkylamino, and —O—R^{10}, wherein R^{10} is

(1) $—PO_2(OH)^- M^+$ wherein M^+ is a pharmaceutically acceptable monovalent cation,

(2) $—SO_3^- M^+$, or

(3) $—C(O)(CH_2)_2—CO_2^- M^+$,

(b) C_{1-6}alkylcarbonyl-C_{1-6}alkyl, or

(c) C_{1-6}carboxyalkyl.

15. A method of antagonising the effects of PAF in a subject in need thereof which comprises administrating to said subject a nontoxic therapeutically effective amount of a compound according to claim 1.

4,977,147

17-METHYLENE- AND 17-ETHYLIDENE-ESTRATRIENES

Peter Jungblut, Neustadt-Bueren; Rudolf Wiechert, and Dieter Bittler, both of Berlin, all of Fed. Rep. of Germany, assignors to Schering Aktiengesellschaft, Berlin, Fed. Rep. of Germany

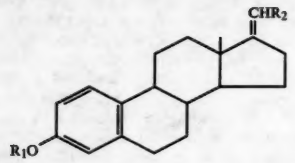
Filed Dec. 7, 1988, Ser. No. 280,803

Claims priority, application Fed. Rep. of Germany, Dec. 7, 1987, 3741801

Int. Cl.[5] **A61K** *31/56, 31/57, 31/58*

U.S. Cl. 514—171 **23 Claims**

1. A composition comprising a compound of formula I



(I)

wherein

R_1 is methyl, tetrahydropyranyl or the acyl group of a C_{1-12} hydrocarbon carboxylic acid or a heterocyclic acid having 1–2 fused rings, wherein each ring contains 4–7 ring atoms and 1–2 hetero contains 4–7 ring aotms and 1–2 hetero atoms which are O, N and/or S, said acyl groups being optionally substituted by C_{1-4} alkyl, hydroxy, C_{4-4}-alkoxy, oxo, amino or halogen, or of a mineral acid, and

R_2 is methyl,

and a pharmaceutically acceptable excipient.

12. A method of treating menopausal symptoms comprising administering a composition of claim 1.

14. A method of treating estrogen deficiency, comprising administering a composition of claim 1.

16. A method of treating hormone-dependent tumors, comprising administering a composition of claim 1.

18. A method of preventing pregnancy, comprising administering to a female mammal a composition of claim 1.

4,977,148

AMIDE DERIVATIVES

Brian R. Holloway, Congleton; Ralph Howe, MacClesfield; Balbir S. Rao, Holmes Chapel, and Donald Stribling, Prestbury, all of England, assignors to Imperial Chemical Industries, London, England

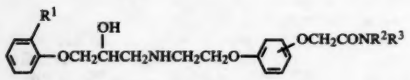
Division of Ser. No. 213,259, Jun. 29, 1988, Pat. No. 4,927,836, which is a continuation-in-part of Ser. No. 75,983, Jul. 21, 1987, abandoned. This application Mar. 8, 1990, Ser. No. 490,406

Claims priority, application United Kingdom, Jul. 23, 1986, 8617986; Jan. 28, 1987, 8701832

Int. Cl.[5] **A61K** *31/33;* **C07D** *225/06*

U.S. Cl. 514—183 **9 Claims**

1. An amide derivative of the formula I set out below:



I

wherein:

R^1 is hydrogen or fluoro;

R^2 is phenyl bearing a cyano substituent (1–4C)alkyl in which the carbon atom linked to the nitrogen of NR^2R^3 bears one or two hydrogens, or is (3–4C)alkenyl, which latter groups bear a carbamoyl substituent;

R^3 is hydrogen, methyl or ethyl; or

R^2 and R^3 together form (4–7C)polymethylene, in which one methylene unit may optionally be replaced by oxygen or sulphur situated at least 2 carbon atoms distant from the nitrogen atom of NR^2R^3, and in which two adjacent methylene units may optionally be replaced by 2 carbon atoms of a benzene ring fused to said (4–7C)polymethylene, said benzene ring itself optionally bearing a substituent selected from the group consisting of halogen, (1–4C-)alkyoxy, (1–4C)alkyl, trifluoromethyl, cyano and nitro; or a pharmaceutically acceptable acid-addition salt thereof.

8. A thermogenic pharmaceutical composition comprising a thermogenically effective amount of a compound of the formula I, or of a pharmaceutically acceptable acid-addition salt thereof, as defined in claim 1, together with a pharmaceutically acceptable diluent or carrier.

4,977,149

PYRIDOQUINOLINE DOPAMINE AGONISTS, COMPOSITIONS AND USE

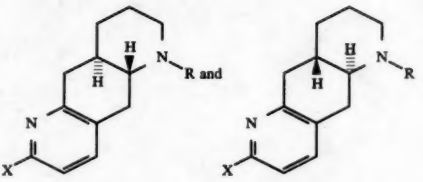
John M. Schaus, Indianapolis, Ind., assignor to Eli Lilly and Company, Indianapolis, Ind.

Division of Ser. No. 383,673, Jul. 24, 1989, Pat. No. 4,939,254. This application Apr. 25, 1990, Ser. No. 514,631

Int. Cl.[5] **A61K** *31/44, 31/535;* **C07D** *471/04*

U.S. Cl. 514—210 **27 Claims**

1. A compound of the formulae



wherein:

X is halo, hydroxy, hydrogen, C_1–C_4 alkyl or a group of the formula $—NR^1R^2$, wherein R^1 and R^2 are individually hydrogen, C_1–C_6 alkyl, C_2–C_6 acyl, or C_1–C_6 alkylphenyl, or where $R^1$and R^2, taken together with the nitrogen atom to which they are attached, form a three- to eight-membered heterocyclic ring containing either one or two nitrogen atoms, or one nitrogen atom and one oxygen atom;

R is C_1–C_4 alkyl, allyl, or cyclopropylmethyl;

and pharmaceutically-acceptable salts thereof.

27. A method for treating Parkinsonism in mammals, which comprises adminstering a therapeutically effective amount of a compound of claim 1 to a mammalian host.

4,977,150

BENZODIAZEPINE COMPOUNDS AND THEIR USE AS PHARMACEUTICALS

Jiban Kumar Chakrabarti, Camberley, and Terrence M. Hotten, Farnborough, both of England, assignors to Lilly Industries Limited, Basingstoke, England

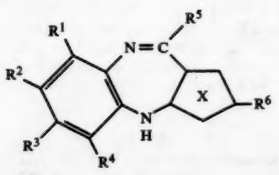
Filed Aug. 4, 1989, Ser. No. 390,029

Claims priority, application United Kingdom, Aug. 11, 1988, 8819059

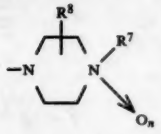
Int. Cl.[5] **C07D** *513/04;* **A61K** *31/55*

U.S. Cl. 514—220 **7 Claims**

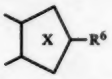
1. A compound of the formula



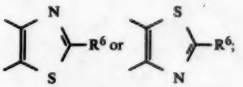
in which R^1, R^2, R^3 and R^4 are independently hydrogen, C_{1-4} alkyl, C_{2-4} alkenyl, halogen, C_{1-4} haloalkyl, nitro, C_{1-4} alkoxy, C_{1-4} haloalkoxy, C_{1-4} alkylthio or phenylsulphonyl; in which R^5 is a group of the formula



where R^7 is hydrogen or C_{1-6} alkyl, C_{3-7} cycloalkyl C_{1-4} alkyl or benzyl or ZO-C_{2-6} alkyl where Z is hydrogen C_{1-20} acyl group, R^8 is hydrogen or C_{1-4} alkyl and n is 0 or 1, provided that when R^7 is hydrogen n is 0; in which R^6 is hydrogen, C_{1-10} alkyl, C_{3-7} cycloalkyl, C_{3-7} cycloalkyl C_{1-4} alkyl, C_{1-4} haloalkyl, C_{1-4} alkoxy or C_{1-4} alkylthio; and in which



represents a thiazole ring selected from



and acid addition salts thereof.

4,977,151

ETHANONE OXIMES AND PHARMACEUTICAL COMPOSITIONS THEREOF

Shinichiro Fujimori, Yokohama; Satoshi Yamazaki, Machida; Mamoru Sugano, Kawasaki; Makoto Kawamura; Kunihiro Ninomiya, both of Machida; Akihiro Tobe, Yokohama, and Issei Nitta, Machida, all of Japan, assignors to Mitsubishi Kasei Corporation, Tokyo, Japan

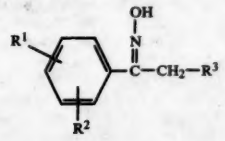
Division of Ser. No. 239,169, Aug. 31, 1988, Pat. No. 4,933,344. This application Mar. 29, 1990, Ser. No. 501,591

Claims priority, application Japan, Sep. 3, 1987, 62-220877

Int. Cl.[5] A61K *31/445;* **C07D** *211/28*

U.S. Cl. 514—225.5 **2 Claims**

1. Ethanone oximes represented by the following general formula I:



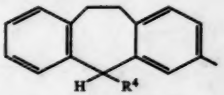
(I)

wherein R^1 represents a cycloalkyl group, aryl group, aralkyl group, aryloxy group, aralkyloxy group, arylthio group or aryl sulfonyl group, those groups being optionally substituted with a substituent selected from an alkyl group having 1 to 3 carbon atoms, an alkoxy group having 1 to 3 carbon atoms and a halogen atom, piperidino group, piperazino group, 4-alkyl substituted piperazino group, imidazolyl group, 4-alkyl substituted imidazolyl group or substituted amino group,

R^2 represents a hydrogen atom or an alkoxy group having 1 to 3 carbon atoms, and

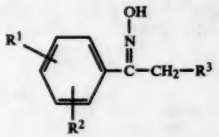
R^3 represents a piperidino group, or

R^1 and R^2 together with a phenyl group to which they are attached may form a phenothiazin-2-yl group, N-acetylphenothiazin-2-yl group, thianthren-2-yl group, dibenzothiophen-3-yl group, dibenzofuran-3-yl group or a group of the formula:



wherein R^4 represents a hydrogen atom or an alkyl group having 1 to 3 carbon atoms, or a pharmaceutically acceptable acid addition salt thereof.

2. A pharmaceutical composition having an antiulcer activity, comprising as a main ingredient ethanone oximes represented by the following general formula I:



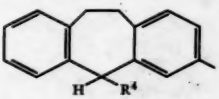
(I)

wherein R^1 represents a cycloalkyl group, aryl group, aralkyl group, aryloxy group, aralkyloxy group, arylthio group or aryl sulfonyl group, those groups being optionally substituted with a substituent selected from an alkyl group having 1 to 3 carbon atoms, an alkoxy group having 1 to 3 carbon atoms and a halogen atom, piperidino group, piperazino group, 4-alkyl substituted piperazino group, imidazolyl group, 4-alkyl substituted imidazolyl group or substituted amino group,

R^2 represents a hydrogen atom or an alkoxy group having 1 to 3 carbon atoms, and

R^3 represents a piperidino group, or

R^1 and R^2 together with a phenyl group to which they are attached may form a phenothiazin-2-yl group, N-acetylphenothiazin-2-yl group, thianthren-2-yl group, dibenzothiophen-3-yl group, dibenzofuran-3-yl group or a group of the formula:



wherein R^4 represents a hydrogen atom or an alkyl group having 1 to 3 carbon atoms, or a pharmaceutically acceptable acid addition salt thereof, in combination with a pharmaceutically acceptable diluent or carrier.

4,977,152

NOVEL TRICYCLIC DERIVATIVES WHICH ARE AGONISTS OF CHOLINERGIC RECEPTORS, AND DRUGS IN WHICH THEY ARE PRESENT

Kathleen Biziere, Clapiers; Camille G. Wermuth, Strasbourg; Paul Worms, Saint Gely Du Fesc, and Jean-Jacques Bourguignon, Hipsheim, all of France, assignors to Societe Anonyme: Sanofi, Paris, France

Continuation of Ser. No. 67,951, Jun. 30, 1987, abandoned. This application Jan. 25, 1990, Ser. No. 471,680

Claims priority, application France, Jul. 3, 1986, 86 09681

Int. Cl.[5] A61K *31/535, 31/50;* **C07D** *237/36, 413/12*

U.S. Cl. 514—232.8 **19 Claims**

1. A tricyclic pyridazine derivative having the formula:

4,977,153

3-AMINOPROPYLOXYPHENYL DERIVATIVES, PHARMACEUTICAL COMPOSITIONS CONTAINING THEM AND METHOD FOR THE THERAPY OF DISEASES

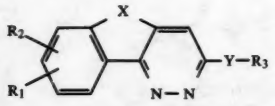
William J. Louis, 5 Von Nida Crescent, Rosanna, Victoria, 3084, Australia; Richard Berthold, Bottringen, Switzerland; Max-Peter Seiler, Riehen, Switzerland, and Andre Stoll, Birsfelden, Switzerland, assignors to William J. Louis, Victoria, Australia

Filed Jan. 14, 1987, Ser. No. 54,177

Claims priority, application Switzerland, May 14, 1985, 2057/85; May 14, 1985, 2061/85; May 14, 1986, 2068/85; May 14, 1986, 2069/85; May 14, 1986, 2070/85; May 14, 1986, 2073/85

Int. Cl.[5] C09D *33/10*; C07C *103/44, 121/75, 127/19, 207/32, 121/80*; A61K *31/38, 31/16, 31/17*

U.S. Cl. 514—237.5 14 Claims



(I)

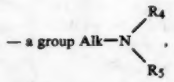
wherein:

X represents a group $(CH_2)_n$, where n is an integer equal to 2, 3 or 4, or alternatively a vinylene group or a methylvinylene group;

R_1 and R_2, each independently represent hydrogen or a substituent occupying one of the free positions of the benzene ring and selected from the group consisting of halogens, a lower alkyl group, a lower alkoxy group, a hydroxyl group, a thiol group, a nitro group, an amino group, a mono- or di-(lower) alkyl amino group and a mono- or di-(lower acyl amino group;

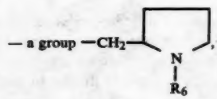
Y represents oxygen, sulphur or a group —NH—; and

R_3 represents:

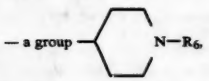


Alk represents a linear or branched alkylene group having from 2 to 5 carbon atoms; and

R_4 and R_5 each independently represents hydrogen, a lower alkyl group or a lower hydroxyalkyl group, or alternatively R_4 and R_5 form, with the nitrogen atom to which they are bonded, an unsubstituted or lower alkyl-substituted pyrrolidin-1-yl, piperidino, morpholino, piperazin-1-yl or 2-oxomorpholino group;



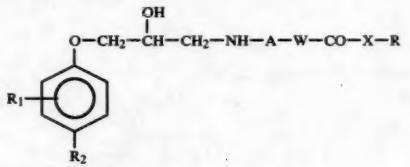
in which R_6 represents a lower alkyl group having 1 to 4 carbon atoms; or



in which R_6 is as defined above;

and salts thereof with pharmaceutically acceptable mineral or organic acids.

1. A compound of the formula I,



wherein

R represents furyl, pyranyl, thienyl, pyrrolyl, indolyl, indolinyl, hydroxyindolinyl, purinyl, hydroxypurinyl, oxindolyl, indazolyl, isoindazolyl, benzimidazolyl, benzimidazolonyl, benztriazolyl, quinolinyl, quinolinonyl, isoquinolinyl, isoquinolinonyl, quinazolinyl or quinazolinonyl which is separated from the moiety X by an alkylene chain of 1 to 5 carbon atoms or an alkenylene chain of 2 to 5 carbon atoms and is unsubstituted or substituted with alkyl of 1 to 4 carbon atoms, or fused with phenyl or phenyl mono- or independently disubstituted with alkyl of 1 to 4 carbon atoms, alkoxy of 1 to 4 carbon atoms or halogen of atomic number 9 to 53, or any of the above unsaturated ring systems in partly saturated or fully saturated form,

R_1 represents hydrogen, hydroxy, alkyl of 1 to 4 carbon atoms, alkoxy of 1 to 4 carbon atoms, alkylthio of 1 to 4 carbon atoms, cycloalkyl of 3 to 7 carbon atoms, halogen of atomic number 9 to 53, trifluoromethyl, pyrol-1-yl, cyano, carbamoyl, alkenyl of 2 to 5 carbon atoms, alkenyloxy of 2 to 5 carbon atoms wherein the double bond is at least one carbon removed from the oxygen, alkanoyl of 2 to 5 carbon atoms, nitro, amino, alkanoylamino of 1 to 5 carbon atoms in the alkoxy moiety,

R_2 represents a physiologically hydrolyzable ester group or a group $—Z—(CH_2)_n—Y—R_3$ wherein R_3 is hydrogen, alkyl or hydroxyalkyl of 1 to 5 carbon atoms, alkenyl of 3 to 7 carbon atoms in which the double bond is at least one carbon removed from Y, cycloalkyl or hydroxy substituted cycloalkyl of 3 to 7 carbon atoms, cycloalkylalkyl or hydroxy substituted cycloalkylalkyl of 4 to 8 carbon atoms, phenyl or phenylalkyl of 6 to 10 carbon atoms in which the phenyl moiety is unsubstituted or

(i) monosubstituted with hydroxy, halogen, alkyl of 1 to 4 carbon atoms, alkoxy of 1 to 4 carbon atoms or carbamoyl, or

(ii) independently disubstituted with hydroxy, alkyl of 1 to 4 carbon atoms, alkoxy of 1 to 4 carbon atoms or carbamoyl,

A represents alkylene or branched alkylene of 2 to 5 carbon atoms,

W represents a bond or imino,

X represents a bond or imino, and

Y represents oxygen or sulfur, and

Z is oxygen and n represents 2 or 3, or

Z is a bond and n represents 1, 2 or 3

or a physiologically hydrolyzable derivative having at least one esterified hydroxy group.

14. A method for the prophylaxis or therapy of diseases responding to blockade of beta adrenoceptors including hypertension or myocardial infarction or sympathetic overstimulation or migraine or glaucoma or thyrotoxicosis or heart rhythm disorders or cardiac failure comprising administering a therapeutically effective amount of a compound or composition as claimed in any one of claims 1 or 2 to 11 to a patient in need of the same.

4,977,154
5-AMINO AND 5-HYDROXY-6-FLUOROQUINOLONES AS ANTIBACTERIAL AGENTS

Joseph P. Sanchez, Canton, and Ashok K. Trehan, Ann Arbor, both of Mich., assignors to Warner-Lambert Company, Morris Plains, N.J.

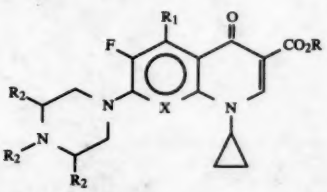
Continuation-in-part of Ser. No. 808,122, Dec. 12, 1985, Pat. No. 4,668,680. This application Oct. 20, 1986, Ser. No. 918,568

The portion of the term of this patent subsequent to May 26, 2004, has been disclaimed.

Int. Cl.[5] A61K *31/495*

U.S. Cl. 514—254 **10 Claims**

1. A compound of the formula



wherein R is hydrogen, a cation or alkyl of one to six carbon atoms; R_1 is amino, hydroxy or alkoxy of one to three carbon atoms; X is CH, or CCl; R_2 is each independently hydrogen or alkyl of one to six carbon atoms, or a pharmaceutically acceptable acid addition or base salt thereof.

4,977,155
1,2,3-TRIAZOLO COMPOUNDS

Poul Jacobsen, Rodovre; Flemming E. Nielsen, Virum; Tage Honorë , Copenhagen, and Jorgen Drejer, Vaerlose, all of Denmark, assignors to A/S Ferrosan, Soborg, Denmark

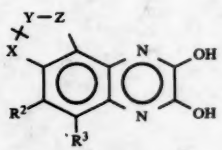
Filed Jun. 22, 1989, Ser. No. 369,762

Claims priority, application Denmark, Jun. 28, 1988, 3567/88

Int. Cl.[5] C07D *487/04, 513/04, 495/04;* A61K *31/495*

U.S. Cl. 514—250 **17 Claims**

1. A heterocyclic compound selected from those having the formula I



wherein R^2 is hydrogen, NO_2, NH_2, CN, halogen, or SO_2NH_2; —X—Y—Z— is selected from —N=N—NR^3—, —NR^3—N=N—, and =N—NR^3—N=, wherein R^3 is hydrogen, lower alkyl, or CF_3, and a pharmaceutically-acceptable salt thereof.

6. A pharmaceutical composition comprising as active glutamate-antagonistic component a heterocyclic compound according to claim 1 and a pharmaceutically acceptable carrier.

4,977,156
AMINO PIPERAZINE ESTERS SHOWING BIOCIDAL ACTIVITY

Jimmy Myers, Sweeny, and Wilfred W. Wilson, Freeport, both of Tex., assignors to The Dow Chemical Company, Midland, Mich.

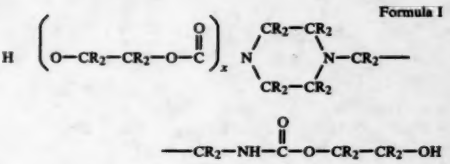
Filed Jul. 26, 1988, Ser. No. 224,597

Int. Cl.[5] A61K *31/495;* C07D *295/92*

U.S. Cl. 514—255 **9 Claims**

1. A compound represented by the formula:

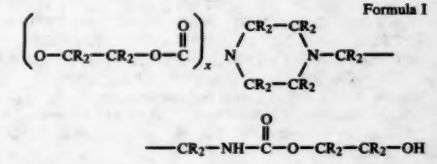
Formula I



wherein x is 0 or 1 and each R is independently hydrogen or inert substitution.

5. A method of retarding or eliminating the growth of a fungus in an environment that is conducive to the growth of the fungus, comprising placing in the environment a growth inhibiting amount of compound having the following formula:

Formula I



wherein x is 0 or 1 and each R is independently hydrogen or inert substitution.

4,977,157
AQUEOUS PREPARATION OF 9-METHYL-3-(1H-TETRAZOL-5-YL)-4H-PYRIDO[1,2-A]PYRIMIDIN-4-ONE POTASSIUM SALT

Takashi Yazaki, and Kazunori Takuma, both of Misato, Japan, assignors to Tokyo Tanabe Company, Ltd., Tokyo, Japan

Filed Oct. 27, 1988, Ser. No. 264,439

Claims priority, application Japan, Nov. 10, 1987, 62-282064

Int. Cl.[5] A61K *31/505*

U.S. Cl. 514—258 **11 Claims**

1. An antiallergic aqueous preparation containing an antiallergically effective amount of 0.05 to 0.5% (w/v) of 9-methyl-3-(1H-tetrazol-5yl)-4H-pyrido pyrimidin-4-one potassium salt, 0.1 to 0.5% (w/v) of dibasic potassium phosphate and 0.005 to 0.2% (w/v) of monobasic potassium phosphate.

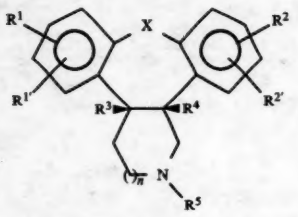
4,977,158
DIBENZOXEPINON AND DIBENZOTHIEPINO-PYRIDINOL OR - PYRROTOL DERIVATIVES WITH ANTI-DEPRESSANT ACTION

Johannes H. Wieringa, Heesch, Netherlands, assignor to Akzo N.V., Arnhem, Netherlands

Filed Aug. 23, 1989, Ser. No. 397,228
Claims priority, application Netherlands, Aug. 26, 1988, 8802109
Int. Cl.[5] A61K *31/40, 31/44;* C07D *491/044*
U.S. Cl. 514—285 5 Claims

1. Tetracyclic compounds of the formula I:

I



wherein:

R^1R^{11}, R^2 and R^{21} independently represent substitutents selected from the group consisting of H, OH, halogen, C_1–C_4 alkyl and C_1–C_4 alkoxy;

R^3 and R^4 are two substituents which are in the cis configuration and of which one is H and the other is OH;

R^5 is H or C_1–C_4 alkyl;

X denotes O or S;

n is 0 or 1;

and functional derivatives hereof.

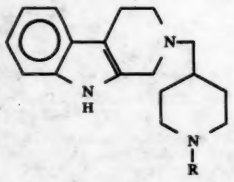
4,977,159
2-[(4-PIPERIDYL)METHYL]-1,2,3,4-TETRAHYDRO-9H-PYRIDO[3,4-b]INDOLE DERIVATIVES, AND THEIR APPLICATION IN TREATING DEPRESSIVE STATE, ANXIETY STATE OR HYPERTENSION

Mireille Sevrin, Paris; Pascal George; Jacques Menin, both of Vitry Sur Seine; Claude Morel, Magny Les Hameaux, and Dennis Bigg, Castres, all of France, assignors to Synthelabo, Paris, France

Filed Aug. 5, 1988, Ser. No. 228,751
Claims priority, application France, Aug. 7, 1987, 87 11291
Int. Cl.[5] C07D *471/02;* A61K *31/44*
U.S. Cl. 514—292 5 Claims

1. A compound which is a pyrido[3,4-b] derivative of formula (I)

(I)



in which R is a hydrogen atom or a group of formula COR_1, $COOR_2$, $CONHR_3$ or SO_2R_4, wherein R_1 is a C_1–C_6 alkyl group, a benzyl group or a phenyl group unsubstituted or substituted with 1 to 3 substituents selected from the group consisting of halogen atoms and trifluoromethyl, C_1–C_3 alkyl and C_1–C_3 alkoxy groups, wherein R_2 is a C_1–C_6 alkyl group or a benzyl group, wherein R_3 is a C_1–C_6 alkyl group or a phenyl group, and wherein R_4 is a phenyl group, or a pharmacologically acceptable acid addition salt thereof.

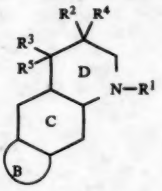
4. A method of treatment of a depressive state or anxiety state, which comprises administering to a subject suffering or liable to suffer therefrom an effective amount of a compound as defined in claim 1.

4,977,160
BCD TRICYCLIC ERGOLINE PART-STRUCTURE ANALOGUES

Diane L. Huser, and John M. Schaus, both of Indianapolis, Ind., assignors to Eli Lilly and Company, Indianapolis, Ind.

Division of Ser. No. 874,741, Jun. 16, 1986, Pat. No. 4,826,986.
This application Feb. 16, 1989, Ser. No. 311,904
Int. Cl.[5] C07D *487/04;* A61K *31/435, 31/47*
U.S. Cl. 514—293 15 Claims

1. A BCD tricyclic ergoline part-structure analogue of the formula (1)



wherein:

the C and D rings are trans fused;

R^1 is (C_1–C_3) alkyl, allyl, or cyclopropylmethyl;

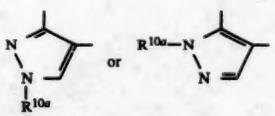
R^2 is hydrogen, CH_2OH, CH_2OCH_3, CH_2SCH_3, CH_2SOCH_3, $CH_2SO_2CH_3$, C_2OR^6, or $CONR^7R^8$, where R^6 is hydrogen, (C_1–C_4) alkyl or benzyl, and R^7 and R^8 are independently selected from hydrogen, (C_1–C_4) alkyl, phenyl, benzyl, and phenethyl;

R^3 is hydrogen, OH, NH_2, $NHCOR^9$ or $NHSO_2NR^9R^{10}$, where R^9 and R^{10} are independently selected from hydrogen, (C_1–C_4) alkyl, and phenyl, or R^3 and R^5 combine to form =O or =NOH;

R^4 and R^5 are both hydrogen, or combine to form a carbon-carbon bond, except that R^4 is hydrogen when R^5 combines with R^3 to form =O or =NOH;

provided that one of R^2 and R^3 is hydrogen and the other is not hydrogen, and further provided that R^2 is hydrogen unless R^4 and R^5 combine to form a carbon-carbon bond; and

represents



where R^{10a} is hydrogen or (C_1–C_3) alkyl, or a pharmaceutically acceptable salt thereof.

4,977,161

ISOXAZOLOPYRIDINE TYPE MEVALONOLACTONES

Yoshihiro Fujikawa; Mikio Suzuki; Hiroshi Iwasaki, all of Funabashi; Mitsuaki Sakashita, and Masaki Kitahara, both of Shiraoka, all of Japan, assignors to Nissan Chemical Industries, Ltd., Tokyo, Japan

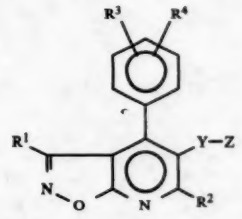
Filed Nov. 13, 1989, Ser. No. 434,254

Claims priority, application Japan, Nov. 18, 1988, 63-291798; Sep. 12, 1989, 62-236172

Int. Cl.[5] A61K *31/435*; C07D *498/04*

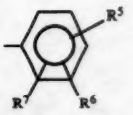
U.S. Cl. 514—302 12 Claims

1. The compound of the formula:

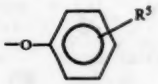


(I)

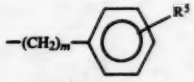
wherein R^1 is hydrogen, C_{1-8} alkyl, C_{2-6} alkenyl, C_{3-7} cycloalkyl, C_{1-6} alkoxy, C_{1-6} alkylthio, fluoro, chloro, bromo,



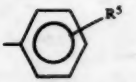
(wherein R^5, R^6 and R^7 are independently hydrogen, C_{1-4} alkyl, C_{1-3} alkoxy, C_{3-7} cycloalkyl, trifluoromethyl, fluoro, chloro or bromo), 2-, 3- or 4-pyridyl, 2- or 3-thienyl, 2- or 3-furyl, 2- or 5-pyrimidyl,



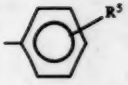
(wherein R^5 is as defined above) or $—NR^8R^9$ (wherein R^8 and R^9 are independently hydrogen, C_{1-4} alkyl or



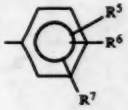
(wherein R^5 is as defined above, and m is 1, 2 or 3) or R^8 and R^9 together form $—(CH_2)_j—$ (wherein j is 3, 4 or 5)); or C_{1-3} alkyl substituted by



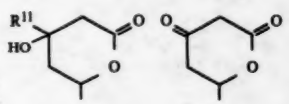
(wherein R^5 is as defined above) and by 0, 1 or 2 members selected from the group consisting of C_{1-8} alkyl, or α- or β-naphthyl; R^2 is hydrogen, C^{1-8} alkyl, C_{2-6} alkenyl, C_{3-7} cycloalkyl, C_{5-7} cycloalkenyl or



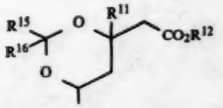
(wherein R^5 is as defined above), or C_{1-3} alkyl substituted by



(wherein R^5, R^6 and R^7 are as defined above) and by 0, 1 or 2 members selected from the group consisting of C_{1-3} alkyl; R^3 and R^4 are independently hydrogen, C_{1-8} alkyl, C_{3-7} cycloalkyl, C_{1-3} alkoxy, n-butoxy, i-butoxy, sec-butoxy, t-butoxy, $R^{23}R^{24}N—$ (R^{23} and R^{24} are independently hydrogen or C_{1-3} alkyl), trifluoromethyl, trifluoromethoxy, difluoromethoxy, fluoro, chloro, bromo, phenyl, phenoxy, benzyloxy, hydroxy, trimethylsilyloxy, diphenyl-t-butylsilyloxy, hydroxymethyl or $—O(CH_2)_lOR^{10}$ (wherein R^{10} is hydrogen, or C_{1-3} alkyl, and l is 1, 2 or 3); or when located at the ortho position to each other, R^3 and R^4 may together form $—CH=CH—CH=CH—$ or methylenedioxy; Y is $—CH_2—$, $—CH_2CH2—$, $—CH=CH—$, $—CH_2—CH=CH—$, $—CH=CH—CH_2—$, $—C(CH_3)=CH—$ or $—CH=C(CH_3)—$; and Z is $—Q—CH_2WCH_2—CO_2R^{12}$,



or



(wherein Q is —C(O)—, $—C(OR^{13})_2—$ or —CH(OH)—; W is —C(O)—, $—C(OR^{13})_2$ or $—C(R^{11})(OH)—$; R^{11} is hydrogen or C_{1-3} alkyl; R^{12} is hydrogen, R^{14} (wherein R^{14} is alkyl moiety of chemically or physiologically hydrolyzable alkyl ester) or M (wherein M is $NHR^{17}R^{18}R^{19}$ (wherein R^{17}, R^{18} and R^{19} are independently hydrogen or C_{1-4} alkyl), sodium, potassium or ½ calcium); two R^{13} are independently primary or secondary C_{1-6} alkyl; or two R_{13} together form $—(CH_2)_2—$ or $—(CH_2)_3—$; and R^{15} and R^{16} are independently hydrogen or C_{1-3} alkyl; or R^{15} and R^{16} together form $—(CH_2)_2—$ or $—(CH_2)_3—$).

4,977,162

QUINOLINYL-CHROMONE DERIVATIVES AND USE FOR TREATMENT OF HYPERSENSITIVE AILMENTS

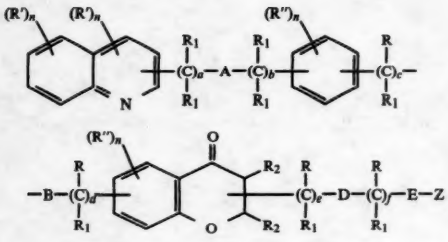
Fu-Chih Huang, Gwynedd; Henry F. Campbell, North Wales; Keith S. Learn, Perkiomenville, and Robert A. Galemmo, Jr., Lansdale, all of Pa., assignors to Rorer Pharmaceutical Corporation, Fort Washington, Pa.

Filed Jul. 13, 1989, Ser. No. 379,528

Int. Cl.[5] C07D *403/10*; A61K *31/47*

U.S. Cl. 514—314 23 Claims

1. A compound of the formula:

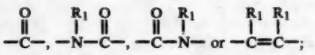


where:

A is O, S,

or a carbon-carbon single bond;

B is a carbon-carbon single bond, O, S, SO, SO_2, NR_1,



D is O, S, NR_1,

or a carbon-carbon single bond;

E is a carbon-carbon single bond or

a is 0–1; b is 0–1; c is 0–3; d is 0–3; e is 0–3; f is 0–3; n is 0–2;

R′ is independently hydrogen, alkyl having 1 to 6 carbon atoms, hydroxy, alkoxy having 1 to 6 carbon atoms, carboxy, carbalkoxy wherein alkoxy has 1 to 6 carbon atoms, halo, nitro, trifluoromethyl, cyano acetyl, propionyl or benzoyl;

R″ is independently hydrogen, hydroxy, alkoxy having 1 to 6 carbon atoms, halo trifluoromethyl or $—(CH_2)_x—M—(CH_2)_y—X$;

R_1 is independently hydrogen, alkyl having 1 to 6 carbon atoms, benzyl or phenethyl;

R is independently hydrogen or $—(CH_2)_x—M—(CH_2)_y—X$ provided M and A or B are not geminal oxygen atoms; x is 0–3; y is 0–3; M is a carbon-carbon single bond; O, S or NR_1;

X is hydrogen, alkyl having 1 to 6 carbon atoms, alkenyl having 2 to 6 carbon atoms, cycloalkyl having 3 to 6 carbon atoms, phenyl, benzyl, phenethyl, hydroxy, alkoxy having 1 to 6 carbon atoms, aralkoxy, wherein aryl is phenyl and alkoxy has 1 to 6 carbon atoms, amino, mono- and di-alkylamino having 1 to 6 carbon atoms, benzylamino, phenethylamino, acetylamino, pripionylamino, benzoylamino, $—CONR_1R_1$, —COOR, CN, tetrazolyl or

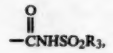
where R_3 is hydrogen, alkyl having 1 to about 6 carbon atoms, trifluoromethyl, phenyl or benzyl;

vicinal R groups together may be $(CH_2)_y—$ where y is 1–4, thus forming a 3–6 membered ring;

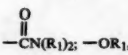
geminal $R_1$and R groups may together form a spiro substituent, $—(CH_2)_z—$, where z is 2–5;

geminal R_1 or R_1 and R groups may together form an alkylidenyl substituent, CHR_1;

Z is $—COOR_1$; —CN;



where R_3 is as described above,



or tetrazolyl or substituted tetrazolyl where the substituent may be alkyl having 1 to 6 carbon atoms, carboxylalkyl wherein alkyl having 1 to 6 carbon atoms and alkyl has 1 to 6 carbon atoms; and pharmaceutically acceptable salts thereof.

22. A method for the treatment of hypersensitive ailments in a patient requiring such treatment which comprises administering to such patient an effective amount of a compound of the formula according to claim 1.

4,977,163

AMINOCYCLOPENTANOL ACIDS AND ESTERS AND THEIR PREPARATION AND PHARMACEUTICAL FORMULATION

Eric W. Collington, Welwyn; Peter Hallett, Royston; Christopher J. Wallis, Royston; Alan Wadsworth, Royston, and Norman F. Hayes, Hitchin, all of England, assignors to Glaxo Group Limited, London, England

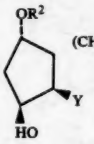
Continuation of Ser. No. 750,655, Jul. 1, 1985, abandoned, which is a continuation of Ser. No. 584,300, Mar. 5, 1984, abandoned, which is a continuation of Ser. No. 437,332, Oct. 28, 1982, abandoned, which is a continuation-in-part of Ser. No. 372,823, Apr. 28, 1982, abandoned. This application Apr. 11, 1988, Ser. No. 183,293

Claims priority, application United Kingdom, Apr. 29, 1981, 8113238; Jul. 2, 1981, 8120459

Int. Cl.[5] **A61K** *31/445, 31/535;* **C07D** *211/14, 295/112*

U.S. Cl. 514—317 **13 Claims**

1. Compounds of the general formula (I)



(I)

wherein

R^1 is a hydrogen atom or a C_{1-6}alkyl group;

W is a straight or branched C_{1-7} alkylene group;

X is cis or trans —CH=CH—;

Y is a saturated heterocyclic amino group (attached to the cyclopentane ring via the nitrogen atom) selected from piperidino, morpholino and thiamorpholino; and R^2 is a phenylalkyl group in which the alkyl portion contains 1–3 carbon atoms and the phenyl is substituted by phenyl (C_{1-3}) alkyl, phenyl, or (C_{1-3}) alkoxyphenyl, and the physiologically acceptable salts and solvates thereof.

11. A method for the treatment or prevention of occlusive vascular diseases which comprises administering to the patient

an effective amount of a compound as claimed in claim 1 or a physiologically acceptable salt or solvate thereof.

12. A method as claimed in claim 11 wherein said compound is [1α(Z),2β,3β,5α]-(±)-7-[5-[[(1,1'-biphenyl)-4-yl]methoxy]-3-hydroxy-2-(1-piperidinyl)cyclopentyl]-4-heptenoic acid and the physiologically acceptable salts and solvates thereof.

4,977,164

FUNGICIDAL N-(SUBSTITUTED THIO)-PYRIDYL CYCLOPROPANE CARBOXAMIDES

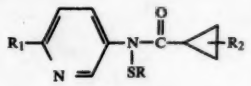
Don R. Baker, Orinda, and Keith H. Brownell, San Jose, both of Calif., assignors to ICI Americas Inc., Wilmington, Del.

Continuation-in-part of Ser. No. 193,619, May 13, 1988, abandoned, which is a division of Ser. No. 36,544, Apr. 15, 1987, Pat. No. 4,766,135, which is a continuation-in-part of Ser. No. 29,115, Mar. 23, 1986, abandoned, which is a continuation of Ser. No. 859,170, May 2, 1986, abandoned. This application Sep. 28, 1988, Ser. No. 250,477

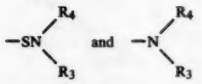
Int. Cl.[5] C07D *211/96, 213/70, 401/12;* A01N *43/40*

U.S. Cl. 514—318 5 Claims

1. A compound having the structural formula

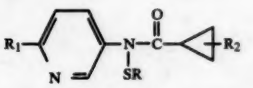


wherein R is selected from the group consisting of

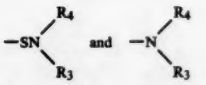


wherein R_3 and R_4 represent C_1–C_4 alkyl, ethoxycarbonyl, phenyl, pyridyl and methoxy pyridyl, and when R_3 and R_4 are alkyl together with the nitrogen atom to which they are attached represent the piperidino moiety; R_1 is selected from the group consisting of C_1–C_3 haloalkoxy and halogen, R_2 is hydrogen or methyl; or a fungicidally acceptable organic or inorganic salt thereof.

4. The method of controlling fungi comprising applying to the area where control is desired a fungicidally effective amount of a compound having the formula



wherein R is selected from the group consisting of



wherein R_3 and R_4 represent C_1–C_4 alkyl, ethoxycarbonyl, phenyl, pyridyl and methoxy pyridyl, and when R_3 and R_4 are alkyl together with the nitrogen atom to which they are attached represent the piperidino moiety; R_1 is selected from the group consisting of C_1–C_3 haloalkoxy and halogen, R_2 is hydrogen or methyl; or a fungicidally acceptable organic or inorganic salt thereof.

4,977,165

PIPERIDINE DERIVATIVE AND THERAPEUTIC AND PREVENTIVE AGENTS FOR ARRHYTHMIA CONTAINING SAME

Hitoshi Oinuma, Tsukuba; Motosuke Yamanaka, Abiko; Kazutoshi Miyake, Ushiku; Tomonori Hoshiko, Ibaraki; Norio Minami, Tsukuba, and Tadao Shoji, Ibaraki , all of Japan, assignors to Eisai Co., Ltd., Tokyo, Japan

Filed Aug. 19, 1988, Ser. No. 234,468

Claims priority, application Japan, Aug. 24, 1987, 62-209726; Aug. 24, 1987, 62-209727; Aug. 24, 1987, 62-209728

The portion of the term of this patent subsequent to Oct. 31, 2006, has been disclaimed.

Int. Cl.[5] A61K *31/445;* C07D *211/96*

U.S. Cl. 514—318 20 Claims

9. A compound as claimed in claim 8 in which Y is phenyl or phenyl substituted with from 1 to 3 substituents selected from the group consisting of alkyl having 1 to 6 carbon atoms, alkoxy having from 1 to 6 carbon atoms and halogen.

4,977,166

BENZOPYRAN DERIVATIVES AND PHARMACEUTICAL COMPOSITIONS CONTAINING THEM

Jean-Claude Hardy, Cergy, and Christian Renault, Taverny, both of France, assignors to Rhone-Poulenc Sante, France

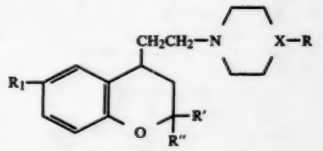
Continuation-in-part of Ser. No. 222,613, Jul. 21, 1988, abandoned. This application Mar. 22, 1989, Ser. No. 327,093

Claims priority, application France, Jul. 23, 1987, 87 10453

Int. Cl.[5] A61K *31/495;* C07D *405/06*

U.S. Cl. 514—323 9 Claims

1. A benzopyran derivative of the formula:

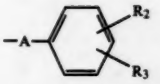


in which

R_1 is hydrogen, halogen, hydroxy, alkoxy, nitro, amino, alkylsulphonamido, bis(alkylsulphonyl)amino or acylamino,

X denotes a nitrogen atom or a >CH—radical,

R is a radical of formula:



in which A is a single bond, methylene or (when X is a nitrogen atom) carbonyl, and R_2 and R_3, which are identical or different, are hydrogen, halogen, hydroxy, alkyl, alkoxy, nitro, amino, alkylsulphonamido, bis(alkylsulphonyl)amino, acylamino, sulphamoyl or cyano, or R_2 and R_3, when they are adjacent, together form a methylenedioxy or ethylenedioxy radical, or else

R is pyridyl or 2(2H)-benzimidazolonyl if X denotes >CH—, and R' and R" are identical and are hydrogen or alkyl, the aforesaid alkyl and acyl radicals containing 1 to 4 carbon atoms each in a straight or branched chain, and its isomeric forms and mixtures thereof, and its acid addition salts.

9. Method of reducing a cardiac rhythm disorder which comprises administering to a subject suffering from such disorder an effective amount of a benzopyran derivative according to claim 1.

4,977,167

CARBAMOYLPYROLIDONE DERIVATIVES AND DRUGS FOR SENILE DEMENTIA

Hiromu Matsumura; Toshisada Yano; Akira Matsushita, all of Hyogo, and Masami Eigyo, Nara, all of Japan, assignors to Shionogi & Co., Ltd., Osaka, Japan

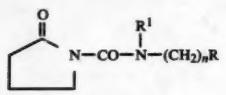
Filed Aug. 17, 1988, Ser. No. 233,142

Claims priority, application Japan, Aug. 19, 1987, 62-205956

Int. Cl.[5] A61K *31/445;* **C07D** *401/12*

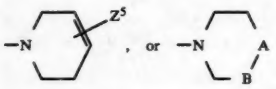
U.S. Cl. 514—326 **6 Claims**

1. A compound of the formula:



(I)

wherein R is



wherein one of A and B is

and the other is $>CH_2$; R^1 is hydrogen or C_1–C_5 alkyl; Z^5 is thienyl or phenyl each optionally substituted by a halogen, methoxy, or methyl group; Z^6 is thienyl or phenyl each optionally substituted by a halogen, methoxy, or methyl group; n is an integer from 2 to 3; and the pharmaceutically acceptable acid addition salts thereof.

6. A pharmaceutical composition for treating a patient suffering from senile dementia comprising a pharmacologically effective amount of a compound claimed in claim **1**, together with a carrier, diluent, and/or excipient therefor.

4,977,168

DERIVATIVES OF THE N α-ARYLSULPHONYLAMINOACYL-P-AMIDINOPHENYL-ALANINAMIDES, AND THEIR USE AS MEDICAMENTS

André Bernat, Cugnaux; Denis Delabassee, Portet/Garonne; Daniel Frehel, Toulouse; Jean-Pierre Maffrand, Portet/Garonne, and Eric Vallee, Tournefeuille, all of France, assignors to Sanofi, Paris, France

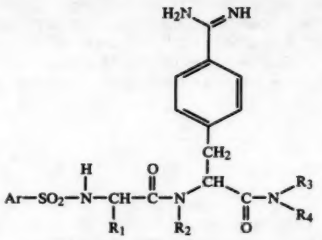
Filed Jan. 23, 1987, Ser. No. 6,152

Claims priority, application France, Jan. 24, 1986, 86 01398; Jan. 24, 1986, 86 01400

Int. Cl.[5] A61K *31/40, 31/445, 31/495;* **C07D** *207/09, 213/53, 239/04*

U.S. Cl. 514—330 **19 Claims**

1. Compounds with the formula:



(I)

in which:

R_1 represents hydrogen, a C_{1-6} alkyl group, C_{1-6} hydroxyalkyl group, a benzyl group, a phenyl group or a 4-hydroxyphenyl group;

R_2 represents a C_{1-6} alkyl, C_{1-6} alkenyl, or C_{1-6} alkynyl group, or a benzyl group, or a C_{1-6} alkoxycarbonylalkyl, C_{1-6} carboxyalkyl or C_{1-6} hydroxyalkyl group;

R_3 and R_4, identical or different, each represents a C_{1-6} alkyl or C_{1-6} hydroxyalkyl radical, C_{1-6} alkenyl or C_{1-6} alkynyl radical or form together with the nitrogen to which they are attached, a saturated heterocycle of the class consisting of pyrrolidino, not substituted or substituted by a C_{1-6} alkoxycarbonyl or carboxy group, piperazino, 4-(C_{1-6}) piperazino, 4-(C_{1-6} hydroxyalkyl)piperazino, or piperidino not substituted or substituted by one of the following groups: -C_{1-6} alkyl, benzyl, hydroxy, C_{1-6} hydroxyalkyl, amino, C_{1-6} aminoalkyl, hydroxyamino, C_{1-6} alkoxycarbonyl or carboxy;

Ar represents a phenyl, alpha-naphthyl or beta-naphthyl group, unsubstituted or substituted with a C_{1-6} alkyl or a C_{1-6} alkoxycarbonyl; and their addition salts with pharmaceutically acceptable mineral or organic acids as well as the stereoisomers or their mixture.

18. Medicament characterized in that it contains, as active principle, a derivative with the formula (I) according to claim **1** or one of its pharmaceutically acceptable salts.

4,977,169

N-3-(5-TRIFLUOROMETHYLPYRIDYL-2-OXY)PHENYL-N'-BENZOYLUREAS FOR CONTROLLING HELMINTHS IN PRODUCTIVE LIVESTOCK

Walter Häusermann, Ollon; Max Maurer, Murten, both of Switzerland, and Thomas Friedel, N.S.W., Australia, assignors to Ciba-Geigy Corporation, Ardsley, N.Y.

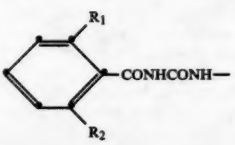
Continuation-in-part of Ser. No. 5,511, Jan. 20, 1987, abandoned. This application May 15, 1989, Ser. No. 352,085

Claims priority, application Switzerland, Jan. 21, 1986, 222/86; Apr. 8, 1986, 1362/86; Dec. 17, 1986, 5053/86

Int. Cl.[5] A01N *43/40*

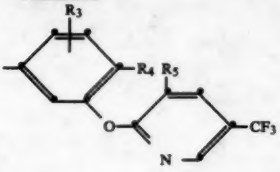
U.S. Cl. 514—346 **10 Claims**

1. A method of controlling helminths in productive livestock, which comprises the step of administering to said livestock an effective amount of a compound of formula I



(I)

-continued



wherein

R_1 is C_1–C_2alkoxy, C_1–C_2alkylthio or halogen,

R_2 is halogen,

R_3 is hydrogen or halogen

R_4 is methyl or halogen, and

R_5 is chlorine.

4,977,170

ISOPRENOIDAMINE COMPOUNDS WHICH ARE USEFUL ANTIULCER AGENTS

Saichi Matsumoto; Masami Dotsuchi, both of Osaka; Takuji Mizui, Hyogo, and Kentaro Hirai, Kyoto, all of Japan, assignors to Shionogi & Co., Ltd., Osaka, Japan

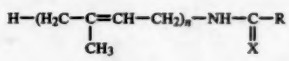
Division of Ser. No. 837,192, Mar. 10, 1986, Pat. No. 4,900,749. This application May 3, 1989, Ser. No. 346,898

Claims priority, application Japan, Mar. 15, 1985, 60-52970

Int. Cl.[5] C07D *213/72;* **A61K** *31/44*

U.S. Cl. 514—352 **16 Claims**

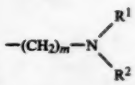
1. A compound of the formula:



wherein

n is an integer of 1 to 6;

R is amino or amino substituted by a member selected from the group consisting of



wherein m=2-5, and R^1 and R^2 are each C_1–C_5 alkyl, phenyl(C_1–C_5 alkyl), halogenophenyl(C_1–C_5 alkyl), 3,4-methylenedioxypenyl (C_1–C_5 alkyl), morpholinyl(C_1–C_5 alkyl), pyridyl-C_1–C_5 alkyl, phenyl, halogenophenyl, trifluoromethylphenyl, C_1–C_5 alkoxyphenyl, pyridyl, C_1–C_5 alkyl, and di(C_1–C_5 alkyl);

X is sulfur or oxygen; or an acid addition salt thereof.

4,977,171

OXA- OR THIA-ZOLINE DERIVATIVE

Junji Suzuki; Tatsuya Ishida; Kazuya Toda; Tatsufumi Ikeda; Yokichi Tsukidate; Kikuchi Yasuo, and Yoshiaki Itoh, all of Nagano, Japan, assignors to Yashima Chemical Industrial Co., Ltd., Tokyo, Japan

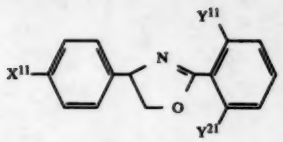
Filed Jun. 2, 1989, Ser. No. 360,866

Claims priority, application Japan, Jun. 9, 1988, 63-140547

Int. Cl.[5] A01N *43/76, 43/78*

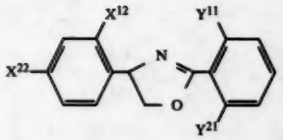
U.S. Cl. 514—365 **9 Claims**

7. A compound represented by the following formula



(I-1)

or



(I-2)

wherein X^{11} represents a linear or branched lower alkyl group, a lower alkoxy group, a halogen atom, a trifluoromethyl group, or a trifluoromethoxy group, and X^{12}, X^{22}, Y^{11} and Y^{21} each represent a halogen atom.

4,977,172

METHOD OF TREATING THE SYMPTOMS OF COGNITIVE DECLINE IN AN ELDERLY PATIENT EMPLOYING (S)-3-ETHYL-4-((1-METHYL-1H-IMIDAZOL-5-YL)-METHYL)-2- OXAZOLIDINONE

Stephen J. Johnson, and Walter H. Moos, both of Ann Arbor, Mich., assignors to Warner-Lambert Company, Morris Plains, N.J.

Filed Sep. 29, 1989, Ser. No. 414,564

Int. Cl.[5] A61K *31/42*

U.S. Cl. 514—374 **11 Claims**

1. A method of treating the symptoms of cognitive decline in an elderly patient comprising administering a cholinergically effective amount of (S)-3-ethyl-4-[(1-methyl-1H-imidazol-5-yl)-methyl]-2-oxazolidinone or a pharmaceutically acceptable salt thereof.

4,977,173

AMINOMETHYL OXOOXAZOLIDINYL ETHENYLBENZENE DERIVATIVES USEFUL AS ANTIBACTERIAL AGENTS

David R. Brittelli, Nottingham, Pa.; Peter F. Corless, Southborough, Mass.; Walter A. Gregory, and Chung-Ho Park, both of Wilmington, Del., assignors to E. I. Du Pont de Nemours and Company, Wilmington, Del.

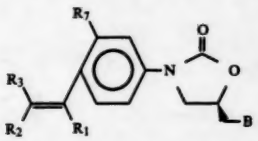
Continuation of Ser. No. 110,837, Oct. 21, 1987, abandoned. This application Jul. 7, 1989, Ser. No. 376,457

The portion of the term of this patent subsequent to Nov. 10, 2004, has been disclaimed.

Int. Cl.[5] C07D *263/20*

U.S. Cl. 514—376 **42 Claims**

1. A compound having the formula:



(I)

wherein for the l isomer or racemic mixtures containing it

m is 1, 2 or 3;

n is 2, 3 or 4;

p is 3, 4 or 5; and

X is CH_2 or a pharmaceutically suitable salt thereof.

4,977,174

7-OXABICYCLOHEPTANE IMIDAZOLE PROSTAGLANDIN ANALOGS USEFUL IN THE TREATMENT OF THROMBOTIC AND VASOSPASTIC DISEASE

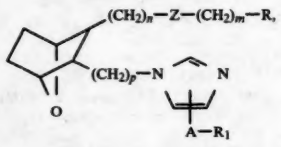
Philip D. Stein, Princeton, and Steven E. Hall, Ewing Township, both of N.J., assignors to E. R. Squibb & Sons, Inc., Princeton, N.J.

Continuation-in-part of Ser. No. 364,408, Jun. 12, 1989. This application Mar. 12, 1990, Ser. No. 492,504

Int. Cl.[5] **C07D** *405/06, 257/04;* **A61K** *31/41, 31/415*

U.S. Cl. 514—382 **31 Claims**

1. A compound having the formula

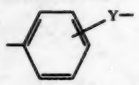


including all stereoisomers thereof, wherein

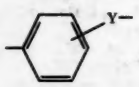
m is 0, 1, 2, 3 or 4;

n is 1, 2 or 3; p is 1, 2 or 3;

Z is —CH=CH—, —CH_2CH_2—or



wherein Y is O or a single bond; with the provisos that when Z is



and m is 0, then Y is a single bone; and when Z is —CH=CH—or —CH_2CH_2—, m is 1, 2, 3 or 4;

R is CO_2H, CO_2alkali metal, CO_2lower alkyl, $CONHSO_2R_2$ (wherein R_2 is lower alkyl or aryl) or —CH_2-5-tetrazolyl;

A is CHOH, C=O,

(wherein R_3 is H or lower alkyl), or a single bond;

R_1 is lower alkyl, phenyl, naphthyl C_3 to C_{12} cycloalkyl or H, R_1 can be H only when A is a single bond.

22. A composition for inhibiting platelet aggregation and bronchoconstriction comprising an effective amount of a compound as defined in claim 1, and a pharmaceutically acceptable carrier therefor.

4,977,175

4,5,6,7-TETRAHYDROBENZIMIDAZOLE DERIVATIVES AS 5HT_3-ANTAGONISTS

Mitsuaki Ohta; Tokuo Koide; Takeshi Suzuki; Akira Matsuhisa, all of Ibaraki; Isao Yanagisawa, and Keiji Miyata, both of Tokyo, all of Japan, assignors to Yamanouchi Pharmaceutical Co., Ltd., Tokyo, Japan

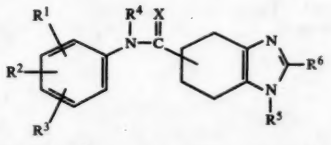
Filed Dec. 14, 1989, Ser. No. 450,748

Claims priority, application Japan, Dec. 22, 1988, 63-325327; Feb. 28, 1989, 1-48896

Int. Cl.[5] **A61K** *31/415;* **C07D** *235/04*

U.S. Cl. 514—394 **10 Claims**

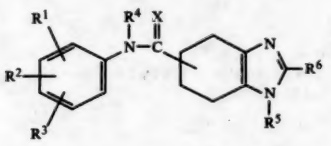
1. A 4,5,6,7-tetrahydrobenzimidazole derivative represented by general formula (I):



(I)

(wherein R^1, R^2 and R^3 independently represent hydrogen atom, hydroxy group, a halogen atom, a lower alkyl group which may optionally be substituted with a halogen atom, a lower alkoxy group, a lower alkylthio group, an aralkyloxy group, an aryloxy group, a lower alkanoyl group, carboxy group, a lower alkoxycarbonyl group or nitro group; R^4, R^5 and R^6 independently represent hydrogen atom or a lower alkyl group; and X represents oxygen atom or sulfur atom), or a tautomer thereof or a pharmceutically acceptable salt thereof.

5. A pharmaceutical composition useful as a 5-HT_3 antagonist comprising an effective amount of 4,5,6,7-tetrahydrobenzimidazole derivative represented by formula (I):



(I)

wherein R^1, R^2 and R^3 independently represent hydrogen atom, hydroxy group, a halogen atom, a lower alkyl group which may optonally be substituted with a halogen atom, a lower alkoxy group, a lower alkylthio group, an aralkyloxy group, an aryloxy group, a lower alkanoyl group, carboxy group, a lower alkoxycarbonyl group or nitro group; R^4, R^5 and R^6 independently represent hydrogen atom or a lower alkyl group; and X represens oxygen atom or sulfur atom, or a tautomer thereof or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier.

4,977,176

PILOCARPINE COMPOUNDS WHICH ARE USE AS PHARMACEUTICAL AGENTS

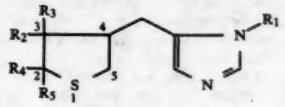
René Amstutz, Himmelried; Georg Bolliger, Binningen, and Gideon Shapiro, Basel, all of Switzerland, assignors to Sandoz Ltd., Basel, Switzerland

Division of Ser. No. 149,812, Jan. 29, 1988, Pat. No. 4,835,174. This application Apr. 11, 1989, Ser. No. 336,279

Int. Cl.[5] **A61K** *31/415;* **C07D** *233/60*

U.S. Cl. 514—397 **18 Claims**

1. A method of treating confusional conditions in the elderly, myasthenia gravis, schizophrenia, mania or glaucoma in a subject in need of such treatment, which comprises administering a therapeutically effective amount of a compound of formula I:



I

wherein
R_1 is (C_{1-4})alkyl,
R_2 and R_3 independently are hydrogen or (C_{1-4})alkyl,
R_4 and R_5 together are =O, =S or =NR, wherein R is mono- or di(C_{1-4})alkylcarbamoyloxy, or
R_4 is hydrogen and
R_5 is hydrogen, hydroxy or —OR', wherein R' is (C_{1-4})alkyl or mono- or di(C_{1-4})alkylcarbamoyl,
in free base or acid addition salt form.

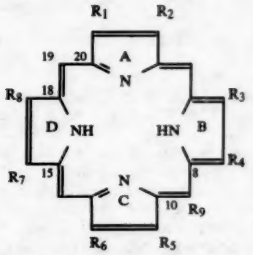
4,977,177

TETRAPYRROLE POLYAMINOMONOCARBOXYLIC ACID THERAPEUTIC AGENTS

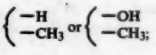
Jerry C. Bommer, Ogden, and Bruce F. Burnham, Logan, both of Utah, assignors to Nippon Petrochemicals Company, Ltd., Tokyo, Japan

Filed Apr. 30, 1985, Ser. No. 728,752
The portion of the term of this patent subsequent to Apr. 7, 2004, has been disclaimed.
Int. Cl.[5] A61K *31/40, 49/00;* **C07D** *487/00*
U.S. Cl. 514—410 **46 Claims**

1. A therapeutic composition for the detection and treatment of tumors sensitive thereto comprising a therapeutically effective amount of a fluorescent mono, di or polyamide of a aminomonocarboxylic acid and a tetrapyrrole compound of the formula:

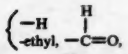


or the corresponding di- or tetrahydrotetrapyrroles wherein R_1 is methyl;

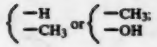


R_2 is H, vinyl, ethyl,

acetyl,



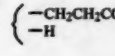
$CH_2CH_2CO_2H$, or =CHCHO;
R_3 is methyl



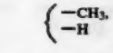
R_4 is H, vinyl, ethyl,

$CH_2CH_2CO_2H$, =CHCHO; or

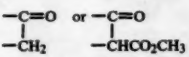
R_5 is methyl;
R_6 is H, $CH_2CH_2CO_2H$, $CH_2CH_2CO_2R$ or CO_2H;
R_7 is $CH_2CH_2CO_2H$, $CH_2CH_2CO_2R$, or



R_8 is methyl or



R_9 is H, COOH, CH_2COOH or methyl;
provided that when R_1, R_2, R_3, R_4, R_7 and R_8 represent two substituents or are divalent and attached to the same carbon, the respective pyrrole ring to which attached is a dihydropyrrole;
R is lower alkyl or benzyl;
R_6 and R_9, taken together are



with the proviso that at least one of R_1–R_9 includes a free carboxyl group, or salts thereof; and a pharmaceutically acceptable carrier therefor.

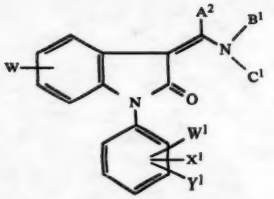
4,977,178

METHOD OF TREATING ANXIETY AND DEPRESSION WITH 1-PHENYL-2(1H,3H)-INDOLONE PSYCHO-THERAPEUTIC AGENTS

Harry R. Howard, Jr., Bristol, and Reinhard Sarges, Mystic, both of Conn., assignors to Pfizer Inc., New York, N.Y.

Division of Ser. No. 81,262, Aug. 3, 1987, Pat. No. 4,879,391, which is a division of Ser. No. 641,071, Aug. 15, 1984, Pat. No. 4,861,880, which is a division of Ser. No. 420,544, Sep. 20, 1982, Pat. No. 4,476,307. This application Jul. 19, 1989, Ser. No. 382,614
Int. Cl.[5] A01N *43/38;* **C07D** *209/34*
U.S. Cl. 514—418 **14 Claims**

1. A method of treating anxiety in a hyperanxious person which comprises treating said person with an anxiolytic amount of a compound of the formula



wherein,

in a first alternative,

A^2 is hydrogen or methyl, and B^1 and C^1 are each independently hydrogen, (C_1–C_2)alkyl, phenyl or benzyl;

in a second alternative,

A^2 is hydrogen or methyl, and B^1 and C^1 together with the nitrogen atom to which they are attached form a piperidine, pyrrolidine, morpholine or imidazole ring;

in a third alternative,

A^2 and B^1 together are 1,3-propylene, 1,4-butylene or 1,5-pentylene, and C^1 is hydrogen, (C_1–C_2)alkyl, phenyl or benzyl;

W is hydrogen, (C_1–C_2)alkyl, (C_1–C_2)alkoxy, chloro or fluoro;

W^1, X^1 and Y^1 are each independently hydrogen, (C_1–C_2)alkyl, (C_1–C_2)alkoxy, (C_1–C_2)alkylthio, bromo, chloro, fluoro, trifluoromethyl, hydroxy, formyl, carboxamido, (C_1–C_2)alkylcarboxamido, di(C_1–C_2)alkylcarboxamido, cyano, nitro, amino, (C_1–C_2)alkylamino or di(C_1–C_2)alkylamino;

with the proviso that when A^2 is hydrogen or methyl, B^1 and C^1 are each independently hydrogen, (C_1–C_2)alkyl, phenyl or benzyl, and any one of W^1, X^1 and Y^1 is 4-chloro, at least one of W^1, X^1 and Y^1 is other than hydrogen.

4,977,179

PROLINE DERIVATIVES

Shizuo Nakamura, Naruto; Masatoshi Inai; Makoto Inoue, both of Tokushima; Kazushi Nagao, Naruto, and Yoshiaki Tsuda, Anan, all of Japan, assignors to Otsuka Pharmaceutical Factory, Inc., Tokushima, Japan

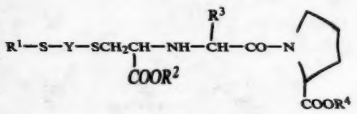
Continuation of Ser. No. 1,779, Jan. 9, 1987, abandoned. This application Apr. 19, 1989, Ser. No. 341,234

Claims priority, application Japan, Jan. 17, 1986, 61-8634; Apr. 14, 1986, 61-85797; Dec. 9, 1986, 61-293782

Int. Cl.[5] A61K 31/40; C07D 207/12

U.S. Cl. 514—423 14 Claims

1. A proline derivative represented by the formula



wherein

R^1 is C_1–C_8 alkyl, C_3–C_8 cycloalkyl or C_3–C_8 cycloalkyl-C_1–C_6 alkyl;

R^2 and R^4 are the same or different and each represents hydrogen or C_1–C_6 alkyl; R^3 is C_1–C_6 alkyl; and

Y is C_2 alkylene;

or a pharmaceutically acceptable salt thereof.

11. A method for inhibiting angiotensin converting enzyme comprising administering to a patient of an effective amount of at least one of the proline derivative and pharmaceutically acceptable salt thereof as defined in claim 1 in an amount effective for inhibiting the angiotensin converting enzyme.

4,977,180

NOVEL PROLINAL DERIVATIVES

Masaaki Toda, Osaka; Shuichi Ohuchida, Kyoto, and Hiroyuki Ohno, Shiga, all of Japan, assignors to Ono Pharmaceutical Co., Ltd., Osaka, Japan

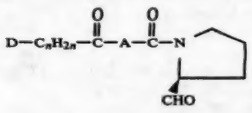
Filed Feb. 3, 1988, Ser. No. 151,862

Claims priority, application Japan, Feb. 4, 1987, 62-22407

Int. Cl.[5] A61K 31/40; C07D 207/08

U.S. Cl. 514—423 13 Claims

1. A novel prolinal derivative of general formula:



(I)

where A represents alkylene group of from 1 to 4 carbon atom(s) or saturated hydrocarbon ring of from 3 to 7 carbon atoms, n represents a number 2, 3 or 4, D represents mono-, bi- or tri-carbocyclic ring(s) containing not more than 15 carbon atoms which may be partially or fully saturated or aromatic, wherein the said ring(s) represented by D is unsubstituted or substituted by from one to three of halogen atom, alkyl or alkoxy group of from 1 to 4 carbon atom(s), nitro group or trifluoromethyl group.

12. The method for treating amnesia which comprises administering a therapeutically effective amount of prolinal derivative of the general formula (I) depicted in claim 1.

4,977,181

TROMETHAMINE SALT OF 1-METHYL-BETA-OXO-ALPHA-(PHENYLCARBAMOYL)-2-PYRROLEPROPIONITRILE

Gordon N. Walker, Morristown, N.J., assignor to Ciba-Geigy Corporation, Ardsley, N.Y.

PCT No. PCT/US87/03413, § 371 Date Aug. 4, 1989, § 102(e) Date Aug. 4, 1989, PCT Pub. No. WO89/05798, PCT Pub. Date Jun. 29, 1989

PCT Filed Dec. 18, 1987, Ser. No. 424,297

Int. Cl.[5] C07D 207/337; A61K 31/40

U.S. Cl. 514—423 6 Claims

1. The tromethamine salt of 1-methyl-beta-oxo-alpha-(phenylcarbamoyl)-2-pyrrolepropionitrile.

6. A method of inhibiting neutrophil chemotaxis in mammals which comprises administering to a mammal in need thereof an effective amount of the compound of claim 1 or of a pharmaceutical composition comprising said compound.

4,977,182

FUNGICIDAL 3-CYANO-4-PHENYL-PYRROLES

Detlef Wollweber, Wuppertal; Wilhelm Brandes, Leichlingen, and Stefan Dutzmann, Duesseldorf, all of Fed. Rep. of Germany, assignors to Bayer Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

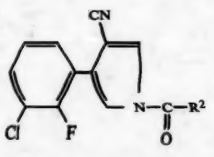
Filed Apr. 12, 1989, Ser. No. 336,983

Claims priority, application Fed. Rep. of Germany, Apr. 29, 1988, 3814478

Int. Cl.[5] A01N 43/36; C07D 207/34

U.S. Cl. 514—423 9 Claims

1.. A 3-cyano-4-phenyl-pyrrole of the formula



(I)

in which

R^2 stands for in each case straight-chain or branched alkyl, alkoxy or alkoxyalkyl, each having 1 to 6 carbon atoms in the individual alkyl moieties.

8. A method of combating fungi which comprises applying to such fungi or to a fungus habitat a fungicidally effective amount of a compound according to claim 1.

4,977,183

3-HALOSUCCINIMIDES AND PLANT FUNGICIDAL USE THEREOF

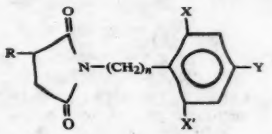
Norman Häberle, Munich, and Anneliese Reutter, Eglharting, both of Fed. Rep. of Germany, assignors to The Dow Chemical Company, Midland, Mich.

Division of Ser. No. 240,763, Jun. 15, 1988, Pat. No. 4,900,840. This application Sep. 12, 1989, Ser. No. 406,404

Int. Cl.[5] A01N 37/32; C07D 207/404

U.S. Cl. 514—425 7 Claims

4. A method for killing and controlling fungi which attack plants or plant products which comprises applying to the fungi or its living area an amount of a composition effective to kill and/or control said fungi, said composition comprising, as the fungicidal-active material, a compound of the formula



I

wherein R signifies a chlorine, bromine or iodine atom, n represents 0, 1, 2 or 3, X, X^1 and Z each represents the same or different substituents, namely, hydrogen atoms, fluorine atoms or methyl groups, and Y is a hydrogen, fluorine, chlorine or bromine atom or a methyl group, with the proviso that when n is 0 and R is simultaneously chlorine, at least one of the residues X, X^1, Y and Z is not a hydrogen atom and that when Z does not signify a hydrogen atom, at least one of the residues X, X^1 and Y also does not signify a hydrogen atom.

4,977,184

BICYCLIC PEROXIDES COMPOSITIONS FOR AND TREATMENT OF MALARIA THEREWITH

Werner Hofheinz, Bottmingen; Gérard Schmid, Kienberg, and Harro Stohler, Binningen, all of Switzerland, assignors to Hoffmann-La Roche Inc., Nutley, N.J.

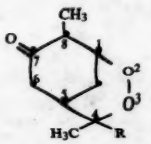
Filed Sep. 29, 1988, Ser. No. 250,666

Claims priority, application Switzerland, Oct. 15, 1987, 4032/87; Jul. 8, 1988, 2612/88

Int. Cl.[5] C07D 319/00; A61K 31/335

U.S. Cl. 514—452 61 Claims

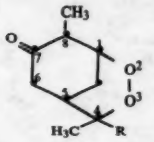
1. Compounds of the formula



I

wherein R is a saturate or unsaturated hydrocarbon group with from 1 to 15 carbon atoms or an aryl, or arylcarbonyl group attached via a lower alkyl or lower alkenyl group.

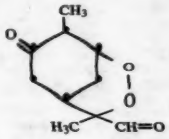
56. A method of combatting malaria comprising administering to a patient an effective amount of a compound of the formula



I

wherein R is a saturated or unsaturated hydrocarbon group with from 1 to 15 carbon atoms or an aryl, heteroaryl, arylcarbonyl or heteroaryl-carbonyl group attached via an alkyl or alkenyl group with from 1 to 7 carbon atoms in a therapeutically inert carrier material.

58. A compound of the formula



III

4,977,185

ANTIRETROVIRAL ARYLOXY SUBSTITUTED FURAN KETONES

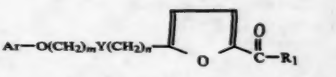
Roger A. Parker, and Sai P. Sunkara, both of Cincinnati, Ohio, assignors to Merrell Dow Pharmaceuticals, Cincinnati, Ohio

Continuation-in-part of Ser. No. 287,817, Dec. 21, 1988, abandoned. This application Nov. 27, 1989, Ser. No. 438,541

Int. Cl.[5] A61K 31/34

U.S. Cl. 514—473 32 Claims

9. A method of treating a retroviral infection in a patient in need thereof which comprises administering to the patient an anti-retrovirally effective amount of a compound of the formula:



wherein Y represents a bond, oxygen or divalent sulfur; Ar represents phenyl or naphthylenyl; n is 0 or 1; m is an integer of from 4 to 10; and R_1 represents C_{1-6} alkyl.

4,977,186

WOOD PRESERVATIVE AND SOIL TREATMENT COMPOSITION

Rainer Gruening, Basking Ridge, N.J., assignor to Troy Chemical Corporation, Newark, N.J.

Filed Nov. 23, 1988, Ser. No. 275,519

Int. Cl.[5] A01N 37/34, 47/10

U.S. Cl. 514—479 13 Claims

1. A composition useful for preserving wood or for treating soil for termite control comprising a termiticidally effective mixture of

(a) a termiticidally enhancing effective amount of 3-iodo-2-propynyl butyl carbamate, and

(b) an insecticidally effective amount of cyano-(3-phenoxyphenyl)-methyl-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate.

4,977,187

TREATING SCHIZOPHRENIA WITH ESSENTIAL FATTY ACID COMPOSITIONS

David F. Horrobin, Guildford, England, assignor to Efamol Holdings PLC, Guildford, England

Filed Jun. 1, 1989, Ser. No. 359,565

Claims priority, application United Kingdom, Jun. 10, 1988, 8813766

Int. Cl.[5] A61K 31/20

U.S. Cl. 514—560 2 Claims

1. A method of treating schizophrenia comprising administering to a patient in need of same an effective amount of a composition comprising an essential fatty acid selected from GLA and a higher n-6 series acid with an essential fatty acid selected from stearidonic acid and a higher n-3 series acid in effective daily amounts of 10 mg and 50 g of each acid, and vitamin E present in an amount at least of 3% by weight based on the total amount of said acids.

4,977,188

METHOD OF TREATING INFLAMMATION

Geoffrey Kneen, High Wycombe; William P. Jackson, Beckenham; Peter J. Islip, Beckenham, and Peter J. Wates, Beckenham, all of England, assignors to Burroughs Wellcome Co., Research Triangle Park, N.C.

Division of Ser. No. 138,870, Dec. 29, 1987, abandoned, which is a continuation of Ser. No. 24,045, Mar. 10, 1987, Pat. No. 4,738,986, which is a division of Ser. No. 838,534, Mar. 11, 1986, abandoned. This application Dec. 11, 1989, Ser. No. 449,606

Claims priority, application United Kingdom, Dec. 30, 1985, 8531839

Int. Cl.[5] A61K 31/19

U.S. Cl. 514—575 2 Claims

1. A method of treating a human suffering from an inflammatory eye condition which comprises administering to said human the compound N-(3-phenoxycinnamyl)acetohydroxamic acid or a physiologically acceptable salt thereof in an amount effective to treat said inflammatory eye condition.

4,977,189

SUBSTITUTED GUANIDINEDICARBONYL DERIVATIVES

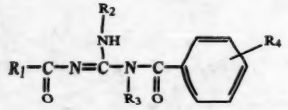
Andrew S. Tomcufcik, Old Tappan, N.J.; James S. Dixon, Malvern, Pa.; Joseph W. Epstein, Monroe, N.Y.; Gary H. Birnberg, Tuxedo, N.Y., and William J. Fanshawe, Pearl River, N.Y., assignors to American Cyanamid Company, Stamford, Conn.

Continuation-in-part of Ser. No. 860,406, May 7, 1986, abandoned. This application Jul. 11, 1988, Ser. No. 217,518

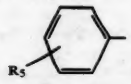
Int. Cl.[5] C07C 311/47, 279/22; A61K 31/18, 31/165

U.S. Cl. 514—603 17 Claims

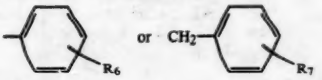
1. A compound of the formula:



wherein R_1 is alkyl (C_1–C_{10}), biphenylyl, phenyl-alkyl(C_1–C_3), phenoxyalkyl (C_1–C_3), naphthyl, cinnamenyl, adamantyl, cycloalkenyl (C_5–C_7) or a moiety of the formula:



wherein R_5 is hydrogen, halogen trifluoromethyl, nitro, alkyl (C_1–C_6) or alkoxy (C_1–C_3); R_2 is dialkyl(C_1–C_3)-aminoalkyl(-C_1–C_3) or a moiety of the formulae:



wherein R_6 is carbamoyl, sulfamoyl, alkyl(C_1–C_9)aminocarbonyl or dialkyl(C_1–C_3)aminocarbonyl and R_7 is carbamoyl or sulfamoyl; R_3 is hydrogen or alkyl(C_1–C_6); and R_4 is hydrogen, halogen, trifluromethyl, nitro, alkyl(C_1–C_6) or alkoxy(C_1–C_6) or alkoxy(C_1–C_3).

14. A method of meliorating anxiety in a warm-blooded animal which comprises administering internally to said warm-blooded animal an effective anti-anxiety amount of a compound of claim 1.

4,977,190

PREPARATION OF RIBOFLAVIN, PRODUCED BY A MICROBIAL METHOD, IN THE FORM OF SPRAY-DRIED GRANULES OR MICROGRANULES

Joachim Meyer, Hessheim; Wolfgang Buehler, Hockenheim; Johannes Grimmer; Gunter Eipper, both of Ludwigshafen; Hans Kiefer, Wachenheim, and Christoph Martin, Mannheim, all of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

Filed Jun. 9, 1989, Ser. No. 363,853

Claims priority, application Fed. Rep. of Germany, Jun. 10, 1988, 3819745

Int. Cl.[5] C07D 471/00

U.S. Cl. 514—951 5 Claims

1. A process for preparation of riboflavin, produced by a microbial method, in the form of free-flowing, non-dusting, spray-dried granules or microgranules, comprising removing water from the mixture discharged from a microbial fermentation for the preparation of riboflavin, wherein the mixture discharged from the fermentation is subjected to a drying process selected from the group consisting of a fluidized-bed spray-drying process, a one-material spray-drying process, and a disk spray-drying process, in the absence of significant amounts of binders being added to the mixture discharged from the fermentation.

4,977,191

WATER-SOLUBLE OR WATER-DISPERSIBLE POLYESTER SIZING COMPOSITIONS

Robert K. Salsman, Conyers, Ga., assignor to The Seydel Companies, Inc., Atlanta, Ga.

Filed Jun. 27, 1989, Ser. No. 372,015

Int. Cl.[5] C08J 11/04

U.S. Cl. 521—48 35 Claims

1. A water-soluble or water-dispersible polyester resin, comprising a reaction product of 20–50% by weight of waste terephthalate polymer, 10–40% by weight of at least one glycol and 5–25% by weight of at least one oxyalkylated polyol.

4,977,192

POLYMER COMPOSITION CHARGED WITH POWDERED MINERAL MATERIAL WITH A HIGH CAPACITY OF WATER ABSORPTION

Pierre Martineu, Bron; Christiane Saunier, Venissieux; Jacky Rousset, Chaillon-sur-Chalaronne, and Christian Jacquemet, Ecully, all of France, assignors to Costex S.A. & Conservatome S.A., Caluire, France

Filed Apr. 28, 1988, Ser. No. 187,462

Claims priority, application France, Apr. 28, 1987, 87 06217

Int. Cl.[5] C08J 9/16; C08F 220/06, 8/42; C08C 19/22

U.S. Cl. 521—56 24 Claims

1. A granular polymer composition having water absorption and desorption capability, comprising:

a water-insoluble but swellable cross-linked polymer material formed of at least one polymer and/or copolymer prepared from at least one unsaturated ethylene monomer having at least one carboxylic, amide, sulfuric, sulfonic, phosphoric, phosphonic, or hydroxyl functional group and at least one powdered mineral charge well dispersed in and bonded to said polymer as a result of its introduction into the mixture of monomers of the same type or of a different type before their polymerization into said polymer or copolymer.

4,977,193

STABILIZATION AND FOAMING OF POLYVINYLCHLORIDE RESINS

Michael R. Croce, Brooklyn, and Stuart D. Brilliant, Levittown, both of N.Y., assignors to Witco Corporation, New York, N.Y.

Filed May 4, 1990, Ser. No. 519,002

Int. Cl.[5] C08J 9/10

U.S. Cl. 521—85 8 Claims

1. In the process for the preparation of foamed polyvinylchloride articles by the heating of polyvinylchloride resin in the presence of a chemical blowing agent, an improvement which comprises foaming of the polyvinylchloride resin in the presence of an activator for the chemical blowing agent comprising (a) at least one organotin mercapto acid ester having the formula:

$$(CH_3)_2Sn[S—Z—(COOR)m]_2$$

wherein Z is an organic radical having from one to about thirty carbon atoms, and R is an organic group derived from an alcohol having from one to about four hydroxyl groups and from one to thirty carbon atoms, and m is an integer from one to four, and (b) a diorganotin oxide complex with an ester of an oxygen-containing acid, wherein the two organo groups are each attached to tin through carbon atoms and are hydrocarbon radicals having from one to about thirty carbon atoms, and said complex is derived from the reaction of the diorganotin oxide with an ester derived from an aliphatic or aromatic alcohol or phenol and an acid selected from the group consisting of hydrocarbyl carboxylic acids, sulfur-containing hydrocarbyl carboxylic acids, hydroxy-containing hydrocarbyl carboxylic acids, phosphoric acid, sulfuric acid, sulphurous acid, nitric acid, nitrous acid, boric acid, arsenic acid and silicic acid.

4,977,194

PROCESS FOR THE PREPARATION OF POLYURETHANE FOAMS

Peter Haas, Haan, and Hans Hettel, Roesrath-Forsbach, both of Fed. Rep. of Germany, assignors to Bayer Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

Filed Aug. 11, 1989, Ser. No. 393,432

Claims priority, application Fed. Rep. of Germany, Aug. 23, 1988, 3828544

Int. Cl.[5] C08G 18/14

U.S. Cl. 521—99 24 Claims

1. A process for the preparation of a polyurethane foam comprising reacting

(1) a polyisocyanate;

with

(2) a dispersion of (i) a polymer-containing relatively high molecular weight hydroxyl compound, said polymer-containing hydroxyl compounds being prepared by reaction of a monoisocyanate or a polyisocyanate with one or more NH-containing compounds selected from the group consisting of a polyamine containing primary and/or secondary amino groups, a hydrazine, a hydrazide, and an alkanolamine, in (ii) a compound containing 1 to about 8 primary and/or secondary hydroxyl groups and having a molecular weight of about 400 to about 16,000;

in the presence of

(3) water, an organic blowing agent, or a combination thereof;

(4) a catalyst; and

(5) a flameproofing agent comprising

(a) about 1 to about 35 parts by weight, based on 100 parts by weight of dispersion (2), of an expandable graphite modified by an inorganic expandable material, and

(b) up to about 35 parts by weight, based on 100 parts by weight of dispersion (2), of an inorganic co-flameproofing agent.

4,977,195

ELASTOMERS

Herbert R. Gillis, Sterrebeek, Belgium, assignor to Imperical Chemical Industries PLC, London, England

Filed Sep. 28, 1988, Ser. No. 248,870

Claims priority, application United Kingdom, Oct. 16, 1987, 8724348

Int. Cl.[5] C08G 18/66

U.S. Cl. 521—155 7 Claims

1. An elastomer which is the reaction product of:

(a) at least one organic polyisocyanate;

(b) at least one compound containing a plurality of isocyanate-reactive groups and having a molecular weight greater than 600, and

(c) at least one chain extender having a molecular weight not exceeding 600,

wherein at least one of components (b) is a compound having at least two isocyanate-reactive group containing sites, at least one of which sites contains at least two isocyanate-reactive groups which are separated one from the other by a chain from 2 to 30 atoms and from another reactive site in said component by a chain of more than 30 atoms.

4,977,196

SOLID STATE POLYMERIZATION OF POROUS PILLS MADE BY COMPACTING POLYESTER PREPOLYMERS

Steven N. Scannapieco, Cuyahoga Falls, Ohio, assignor to The Goodyear Tire & Rubber Company, Akron, Ohio

Continuation-in-part of Ser. No. 341,196, Apr. 21, 1989, which is a division of Ser. No. 229,680, Aug. 3, 1988, Pat. No. 4,849,497.

This application Dec. 26, 1989, Ser. No. 457,024

Int. Cl.[5] C08G 63/02, 63/26

U.S. Cl. 521—182 20 Claims

1. A porous pill which can be solid state polymerized at a very rapid rate into a high molecular weight polyester resin wherein said porous pill is comprised of a polyester prepolymer having an intrinsic viscosity of at least about 0.2 dl/g as measured in a 60:40 phenol:tetrachloroethane solvent system at a temperature of 30° C. and at a concentration of 0.4 g/dl: wherein said porous pill contains a substantial volume of interstices which penetrate the porous pill and open to the outside; and wherein the porous pill is made by compacting fibers of the polyester prepolymer which have a diameter of about 25 microns to about 841 microns and a length of at least 0.08 mm.

4,977,197

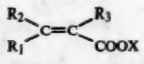
PHOTOPOLYMERIZABLE DENTAL COMPOSITION

Isao Sasaki; Nobuhiro Mukai, both of Hiroshima, and Hitoshi Ige, Ohtake, all of Japan, assignors to Mitsubishi Rayon Company Limited, Tokyo, Japan

Filed May 12, 1988, Ser. No. 192,931
Claims priority, application Japan, Jun. 19, 1987, 62-153022
The portion of the term of this patent subsequent to Aug. 9, 2005, has been disclaimed.
Int. Cl.[5] C08F 226/06; C08K 3/36, 5/11
U.S. Cl. 522—14 4 Claims

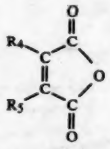
1. A photopolymerizable dental composition, which comprises:

(A) an organic composite filler obtained by polymerizing at least one carboxylic acid monomer of the formula:



(I)

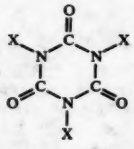
wherein R_1 is a hydrogen atom, a C_1–C_{15} alkyl group, a -COOY group, a halogen atom, or a phenyl group or a derivative thereof; R_2 is a hydrogen atom, a C_1–C_{15} alkyl group, a -COOZ group, a halogen atom, or a phenyl group or a derivative thereof; R_3 is a hydrogen atom, a C_1–C_{15} alkyl group, a halogen atom, or a phenyl group or a derivative thereof; and each of X, Y and Z is a hydrogen atom, NH_4 or an alkali metal atom; or the formula:



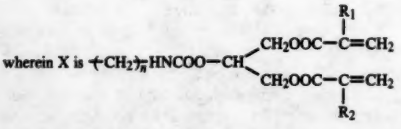
(II)

wherein each of R_4 and R_5 is a hydrogen atom, a C_1–C_{15} alkyl group, a halogen atom, or a phenyl group or a derivative thereof; and at least one radical polymerizable vinyl monomer in a polymerization system in which an inorganic compound is dispersed;

(B) a monomer mixture comprising 2,2-bis[4-(methacryloxyethoxy)phenyl]propane, at least one hexa-functional urethane (meth)acrylate of the formula:

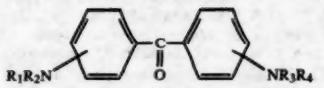


(III)

wherein X is 

wherein n is an integer of from 1 to 10, and each of R_1 and R_2 which may be the same or different is a hydrogen atom or a methyl group, and a diluting ethylenic vinyl monomer; and

(C) a photopolymerization initiator comprising an α-diketone compound and a reducing agent, wherein the reducing agent is a diaminobenzophenone compound of the formula:



(IV)

wherein each of R_1 to R_4 which may be the same or different is a hydrogen atom or a C_1–C_5 alkyl group, provided that at least one of them is the alkyl group.

4,977,198

UV CURABLE EPOXY FUNCTIONAL SILICONES

Richard P. Eckberg, Saratoga Springs, N.Y., assignor to General Electric Company, Waterford, N.Y.

Filed Mar. 21, 1988, Ser. No. 171,498
Int. Cl.[5] C08F 2/50, 30/08, 24/00; C08G 59/16
U.S. Cl. 522—25 15 Claims

1. A UV radiation curable composition comprising:

(A) an epoxy functional organopolysiloxane comprising in sufficient number to crosslink and cure said composition units of the formula:

$$R_aR_b^1SiO_{(4-a-b)/2}$$

wherein R is hydrogen, $C_{(1-8)}$ alkyl, or aryl, R^1 is a monovalent epoxy functional organic radical of from 2 to 20 carbon atoms, a is 0, 1, or 2; b is 1, 2 or 3, and a+b is 1, 2 or 3, and in sufficient number to increase capacity to solubilize component (B) modified units of the formula:

$$R_cR_d^2SiO_{(4-c-d)/2}$$

wherein R is given above, R^2 is the epoxy esterification reaction product of R^1 with HOOC—R^3, R^3 is hydrogen, a C_{1-20} substituted or unsubstituted alkyl radical, or a C_{1-20} substituted or unsubstituted aromatic radical, c is 0, 1 or 2, d is 1, 2 or 3, and c+d is 1, 2 or 3; and

(B) a catalyst amount of onium salt photocatalyst.

4,977,199

PHOTO CURABLE BLENDS OF 2-METHYOXYTETRAHYDROPYRAN AND A CYCLOALIPHATIC DIEPOXIDE

Joseph V. Koleske, Charleston, W. Va., and George T. Kwiatkowski, Green Brook, N.J., assignors to Union Carbide Chemicals and Plastics Company Inc., Danbury, Conn.

Continuation of Ser. No. 901,586, Aug. 29, 1986, abandoned, which is a continuation-in-part of Ser. No. 480,299, May 29, 1983, abandoned. This application Jan. 13, 1989, Ser. No. 298,244
Int. Cl.[5] C08G 59/24, 63/08; C08J 3/28; C08K 5/15
U.S. Cl. 522—31 10 Claims

1. A photopolymerizable composition consisting essentially of 2-methoxytetrahydropyran, the diepoxide, 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate and an aryl sulfonium salt photoinitiator wherein the amount of 2-methoxytetrahydropyran present in said composition is about 5 to about 70 weight percent, based on the combined weight of said pyran and said diepoxide.

4,977,200

ETHYLENE-PROPYLENE ORGANOPOLYSILOXANE RUBBER COMPOSITION

Kunio Itoh; Takeshi Fukuda, and Tsutomu Nakamura, all of Gunma, Japan, assignors to Shin-Etsu Chemical Co., Ltd., Tokyo, Japan

Filed Mar. 30, 1989, Ser. No. 330,576
Claims priority, application Japan, Mar. 31, 1988, 63-78396
Int. Cl.[5] C08K 13/04; C08L 23/16, 83/07
U.S. Cl. 523—223 15 Claims

1. A vulcanizable rubber composition which comprises, in admixture:

(a) 100 parts by weight of a curable rubber blend composed of

(a-1) from 50 to 97% by weight of an ethylene-propylene copolymer, and

(a-2) from 50 to 3% by weight of an organopolysiloxane having an average degree of polymerization of at least 100 and represented by the average unit formula

$$R_nSiO_{(4-n)/2},$$

in which R is a substituted or unsubstituted monovalent hydrocarbon group and the subscript n is a positive number in the range from 1.90 to 2.05, at least two of the groups denoted by R in a molecule being aliphatically unsaturated groups;

(b) from 5 to 200 parts by weight of a reinforcing silica filler having a specific surface area of at least 50 m^2/g;

(c) from 5 to 100 parts by weight of a powder composed of spherical particles having a particle diameter in the range from 0.1 μm to 50 μm;

(d) up to 100 parts by weight of a process oil; and

(e) from 1 to 20 parts by weight of a curing agent for (a).

4,977,201

POLYVINYL CHLORIDE PLASTISOL COMPOSITION

Akio Ogawa; Masahiko Shimada, both of Saitama, and Kazuhiko Ando, Kanagawa, all of Japan, assignors to Asahi Denka Kogyo K.K. and A,C,R. Co., Ltd., both of Tokyo, Japan

Filed Feb. 24, 1989, Ser. No. 315,524
Claims priority, application Japan, Mar. 4, 1988, 63-50747; Apr. 1, 1988, 63-80689; Sep. 9, 1988, 63-226182
Int. Cl.[5] C08L 63/10
U.S. Cl. 523—400 11 Claims

1. A polyvinyl chloride plastisol composition comprising

(i) 10 to 50% by weight of a vinyl chloride polymer and/or copolymer,

(ii) 10 to 50% by weight of a plasticizer,

(iii) a modified epoxy resin containing both unsaturated and hydroxy groups which is prepared by reacting (iii-1) an epoxy resin having more than one adjacent epoxy groups on an average in its molecule with (iii-2) an unsaturated alilphatic acid, and

(iv) a blocked isocyanate as essential components, said blocked isocyanate being prepared in a reaction in which a blocking agent is used in an amount of 1 to 2 times the equivalent amount of free isocyanate groups, the total amount of (iii) the modified epoxy resin and (iv) the blocked isocyanate being 0.1 to 30% by weight and the weight ratio of (iii) the modified epoxy resin to (iv) the blocked isocyanate being between 95:5 to 5:95, said % by weight being based on the weight of the plastisol composition.

4,977,202

CATIONIC, ADVANCED EPOXY RESIN COMPOSITIONS FROM (1) DIGLYCIDYL ETHERS OF PHENOLS (2) DIGLYCIDYL ETHERS OF ALKANE DIOLS AND (3) DIHYDRIC PHENOLS

Nancy A. Rao, and Richard A. Hickner, both of Lake Jackson, assignors to The Dow Chemical Company, Midland, Mich.

Continuation of Ser. No. 69,459, Jul. 2, 1987, Pat. No. 4,868,230.
This application Jul. 6, 1989, Ser. No. 376,800
Int. Cl.[5] C08G 59/14; C08L 63/00; C09D 5/44
U.S. Cl. 523—414 10 Claims

1. In a process of coating a cationic, epoxy resin-based composition onto an object having an electroconductive surface by steps comprising immersing the electroconductive object into a coating bath comprising an aqueous dispersion of cationic particles of the epoxy-based composition, passing an electric current through said bath sufficient to electrodeposit a coating of said composition on the object by providing a difference of electrical potential between the object and an electrode that is (a) spaced apart from said object (b) in electrical contact with said bath and (c) electrically positive in relation to said object, the improvement which comprises using as the cationic resin composition a composition comprising a cationic, advanced epoxy-based resin having a charge density of from about 0.2 to about 0.6 milliequivalent of cationic charge per gram of resin obtained by reacting in the presence of a suitable catalyst

(A) a composition comprising

(1) at least one diglycidylether of an aliphatic diol which diol is essentially free of ether oxygen atoms, and

(2) a diglycidylether of a dihydric phenol, with

(B) at least one dihydric phenol; wherein (A-1) and (A-2) are employed in such quantities that about 10 to about 75 percent of the diglycidylethers contained in component (A) are contributed by (A-1) and from about 25 percent to about 90 percent of the diglycidylethers are contributed by (A-2), and components (A) and (B) are employed in such quantities that the resultant epoxide equivalent weight is from about 350 to about 10,000; whereby, there is formed an advanced epoxy resin having terminal oxirane groups and converting at least some of the oxirane groups to cationic groups.

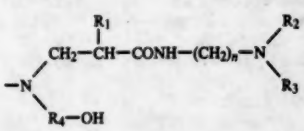
4,977,203

COATING RESIN COMPOSITION

Michiharu Kitabatake, Hiratsuka, Japan, assignor to Kansai Paint Co., Ltd., Hyogo, Japan

Filed Jul. 22, 1988, Ser. No. 222,828
Claims priority, application Japan, Jul. 25, 1987, 62-185666
Int. Cl.[5] C08G 59/14; C09D 5/44; C08L 63/00
U.S. Cl. 523—420 18 Claims

1. A coating resin composition comprising, as a coating-forming resin binder, an epoxy resin derivative containing a functional group represented by the following formula



(I)

wherein

R_1 represents a hydrogen atom or methyl group; each of R_2 and R_3 represents a C_1–C_5 alkyl group independently of the other;

R_4 represents a C_2–C_6 alkylene group in which an ether group (—O—) may be present in the carbon chain; and

n represents an integer from 1 to 6.

4,977,204

NON-AQUEOUS SHADE ENHANCING AGENT

Tsutomu Nebashi; Kazuo Iguchi, both of Utsunomiya, and Moriyasu Murata, Chiba, all of Japan, assignors to Kao Corporation, Tokyo, Japan

PCT No. PCT/JP88/00200, § 371 Date Oct. 20, 1988, § 102(e) Date Oct. 20, 1988, PCT Pub. No. WO88/06635, PCT Pub. Date Sep. 7, 1988

PCT Filed Feb. 25, 1988, Ser. No. 296,084

Claims priority, application Japan, Feb. 25, 1987, 62-42375

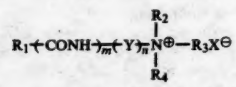
Int. Cl.[5] C08K *5/16, 5/20*

U.S. Cl. 524—186 **9 Claims**

1. A non-aqueous shade enhancing agent composition which comprises:

(a) a copolymer obtained by graft-polymerizing (i) a main chain polymer which is substantially insoluble in a non-aqueous solvent having a solubility parameter in the range of 6.5 to 10.0, with (ii) a branch polymer which is soluble in said solvent, at a weight ratio of the main chain polymer to the branch polymer in the range between 90/10 and 10/90, said main chain polymer being polybutadiene or a copolymer of butadiene and another monomer which is copolymerizable with butadiene, and said branch polymer being a vinyl polymer or a vinyl copolymer, and

(b) a quaternary ammonium salt having the formula (1):



(1)

in which R_1 is alkyl having 8 to 22 carbon atoms, R_2 is an alkyl having 1 to 22 carbon atoms, hydroxyethyl or hydroxypropyl, R_3 and R_4 are each an alkyl having 1 to 3 carbon atoms, hydroxyethyl or hydroxypropyl, at least one of R_3 and R_4 being hydroxyethyl or hydroxypropyl, Y is ethylene or propylene, m is zero or 1, n is a number of zero to 5 and X- is an anion of hydrochloric acid, nitric acid, sulfuric acid, phosphoric acid, perchloric acid, paratoluenesulfonic acid or a hydroxyalkanecarboxylic acid having 2 to 6 carbon atoms,

at a weight ratio of (a) to (b) in the range of 95/5 to 20/80.

4,977,205

ASBESTOS-FREE MATERIAL FOR USE AS SEALING, DAMPING AND/OR SEPARATING ELEMENT

Gerhard Bauer, Neuenmarkt, and Reinhard Rödel, Hof/Saale, both of Fed. Rep. of Germany, assignors to Frenzelit-Werke GmbH & Co. KG, Bad Berneck Frankenhammer, Fed. Rep. of Germany

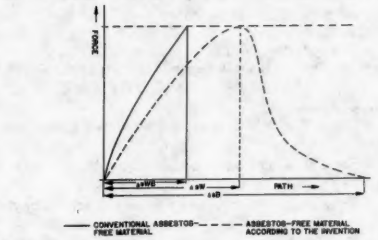
Filed Oct. 21, 1988, Ser. No. 260,725

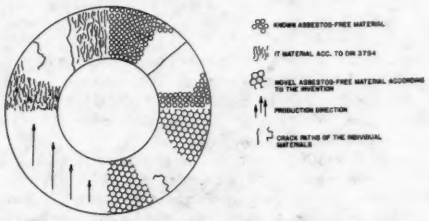
Claims priority, application PCT Int'l Appl., Mar. 31, 1988, PCT/EP88/00267

Int. Cl.[5] C08F *9/00*; C08K *3/04*

U.S. Cl. 524—496 **8 Claims**

1. An asbestos-free material useful for making, sealing, damping and/or separating elements comprising elastomer, process fibers, flake graphite, and fillers wherein the amount of said elastomer is from about 5% to about 20% by weight based on the solvent-free weight of said material; wherein the flake size of said flake graphite is in the range of 50 μm to 250 μm; and wherein the amount of said flake graphite is from about





10% to about 70% by weight based on the solvent-free weight of said material.

4,977,206

MODIFIED POLYBUTYLENE-BASED HOT MELT COMPOSITIONS

Charles C. Hwo, Sugar Land, and Simone Mostert, Cypress, both of Tex., assignors to Shell Oil Company, Houston, Tex.

Continuation-in-part of Ser. No. 91,484, Aug. 31, 1987, abandoned. This application Feb. 3, 1989, Ser. No. 306,430

Int. Cl.[5] C09J *151/00*

U.S. Cl. 524—504 **5 Claims**

1. A hot melt adhesive capable of peelability, consisting of a major amount of a modified ethylene copolymer, comprising:

from about 50 percent by weight to about 95 percent by weight of a modified ethylenic copolymer selected from the group: maleated ethylene methyl acrylate copolymer, and maleated ethylene acrylic acid copolymer;

from about 50 percent by weight to about 5 percent by weight of a butene-1 homopolymer or copolymer; and

up to about 1 part per hundred (phr) of a stabilizer.

4,977,207

WATER DILUTABLE LEVERLER COATING COMPOSITIONS

Rainer Hoefer, Duesseldorf; Roland Gruetzmacher, Wuelfrath; Wolfgang Gress, Wuppertal-Elberfeld, and Ulrich Nagorny, Hilden, all of Fed. Rep. of Germany, assignors to Henkel Kommanditgesellschaft auf Aktien, Duesseldorf-Holthausen, Fed. Rep. of Germany

Filed Feb. 11, 1988, Ser. No. 154,732

Claims priority, application Fed. Rep. of Germany, Feb. 12, 1987, 3704350

Int. Cl.[5] C08G *18/66, 18/36*; C08L *75/04, 61/28*

U.S. Cl. 524—507 **21 Claims**

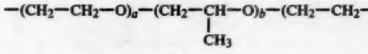
1. A leveler coating composition consisting essentially of water and dispersed materials selected from the group consisting of blocked polyisocyanates, diamines, water-dilutable melamine resin, water-dilutable polyester resin, water-dilutable

polyacrylate resin, and water-dilutable polyurethane resin, all present in amounts effective to form a stable dispersion, said composition having a solids content of about 10–50% by weight, based on the total weight of the dispersion, and a viscosity of about 10–50,000 mPa.s;

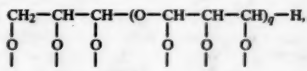
wherein at least about 9% by weight of the solids content based on the total weight of the composition if example 15 is the basis of said composition consists essentially of a water-dilutable polyurethane resin that is a product of chemical reaction of all the following components:

(a) hydroxyl-terminated polyether polyols having a functionally of at least 3, a weight average molecular weight of about 1,000–20,000, and a chemical structure according to the general formula $(R^1)_y—R^2—(R^3)_Z$, wherein

R^1 is

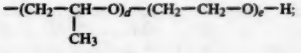


R^2 has a valence of x, x being one of the integers 3, 6, 9, 12, 15, or 18, and a formula selected from the group consisting of $R^4—C—(CH_2O—)_3$, where R^4 is methyl or ethyl, and



where q is an integer from 0 to 5,

R^3 is



z is 0 to 4; y is (x-z); a is 1 to 15; b is 20 to 100; c is 1 to 15; d is 20 to 150; e is 1 to 15; (a+c+e) is 3 to 40; (b+d) is 40 to 300; and (c+e) is 2 to 15;

(b) polyols selected from the group consisting of

(1) castor oil,

(2) products formed by condensing castor oil with up to 50 moles of ethylene oxide per mole of castor oil,

(3) products formed by condensing castor oil with up to 100 moles of propylene oxide per mole of castor oil,

(4) products formed by epoxidizing naturally occurring fats or oils containing at least three carbon-carbon double bonds per molecule and then reacting the resulting products with alcohols to open epoxide rings, and

(5) products formed by epoxidizing naturally occurring fats or oils containing at least three carbon-carbon double bonds per molecule, then reacting the resulting products with alcohols to open epoxide rings, and then condensing the resulting products with C_{2-4} alkylene oxides;

(c) dihydroxy or diamino ionizable anionic compounds; and

(d) organic diisocyanates.

17. The leveler coating composition of claim **1** wherein is present a water-dilutable melamine resin and/or water dilutable polyester resin and/or a water-dilutable polyacrylate resin whose ratio of melamine resin to polyester and/or acrylate resin is 1:1–9, and which is present in a ratio based upon the solids content of the polyurethane resin, of 1:0.1–100.

4,977,208

WATER-ABSORBENT COATING COMPOSITIONS

Yoshio Hosoya; Naotaka Watanabe, both of Tokyo; Isao Takagi, Hyogo, and Atsuo Miyoshi, Hyogo, all of Japan, assignors to Mitsui-Cyanamid, Ltd., Tokyo, Japan

Filed May 16, 1989, Ser. No. 353,327

Claims priority, application Japan, May 20, 1988, 63-121843; May 20, 1988, 63-121844

Int. Cl.[5] C08L *31/04, 33/08*

U.S. Cl. 524—515 **7 Claims**

1. A water-absorbent coating composition comprising:

(i) a non-aqueous dispersion of a resin selected from the group consisting of polymers of at least one of styrene, vinyl acetate and acrylic ester monomers and

(ii) a water-in-oil type emulsion of a water-swellable polymer prepared by emulsifying an aqueous solution of a water-soluble vinyl monomer and a crosslinkable monomer wherein said crosslinkable monomer is selected from group consisting of a divinyl compound, a methylol vinyl compound, a vinyl aldehyde compound, or methylacrylamide glycolate methyl ether in an organic dispersion medium containing a hydrophobic surface-active agent and polymerizing the monomer emulsion thus obtained by the use of a free-radical initiator.

4,977,209

PRODUCTION OF ARTICLES OF BONDED PARTICULATE MATERIAL AND BINDER COMPOSITIONS FOR USE THEREIN FROM PHENOL-FORMALDEHYDE AND OXYANION

Sidney A. Barker; Neil Baggett, both of Birmingham; John Stevenson; Raymond D. George, both of Sutton Coldfield; David R. De Courcy, Birmingham; Timothy Hammond, Stockton-On-Tees, and Martin Bradley, Solihull, all of United Kingdom, assignors to Foseco International Limited, Birmingham, England

Filed Dec. 6, 1988, Ser. No. 280,313

Claims priority, application United Kingdom, Dec. 24, 1987, 8730159; Jul. 6, 1988, 8816106

Int. Cl.[5] C08L *61/06, 8/28;* C08K *3/38, 5/56*

U.S. Cl. 524—594 **22 Claims**

1. A binder composition comprising an alkaline aqueous solution of a resol phenol-aldehyde resin and an oxyanion capable of forming a stable complex with the resin the amount of alkali present in the solution being sufficient to solubilize the resin, and to substantially prevent stable complex formation between the resin and the oxyanion, and the amount of oxyanion present being sufficient to cure the resin when stable complex formation is permitted to take place.

4,977,210

PREPARATION OF PROPYLENE/ETHYLENE POLYMERS OF THE TOUGHENED POLYPROPYLENE TYPE

Juergen Kerth, Carlsberg; Rainer A. Werner, Bad Duerkheim; Ralf Zolk, Weisenheim; Klaus-Dieter Ruempler, Wachenheim; Guenther Schweier, Friedelsheim; Rudolf Mueller-Mall, Neuhofen, and Wolfgang Gruber, Frankenthal, all of Fed. Rep. of Germany, assignors to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

Filed Aug. 4, 1989, Ser. No. 389,818

Claims priority, application Fed. Rep. of Germany, Aug. 13, 1988, 3827565

Int. Cl.[5] C08L *23/12, 23/16;* C08F *297/08*

U.S. Cl. 525—53 **1 Claim**

1. A process for the continuous preparation of a propylene-/ethylene polymer of the toughened polypropylene type, in which, in each case in the presence of hydrogen as a molecular weight regulator, in an agitated fixed bed of finely divided polymer, in the absence of a liquid reaction medium, from the gas phase, first

(A) in a first polymerization zone, propylene is homopoly-

merized by feeding in a Ziegler-Natta catalyst system consisting of

(1) a titanium component which is based on a finely divided, shape-imparting silica gel and contains titanium, magnesium, chlorine and a benzenecarboxylic acid derivative,

(2) an aluminum component of the formula

$$Al\ R_3,$$

where R is alkyl of not more than 8 carbon atoms, and

(3) a silane component of the formula

$$R_n^1Si(OR_2)_{4-n},$$

where R_1 is a saturated aliphatic and/or aromatic hydrocarbon radical of not more than 16 carbon atoms, R^2 is alkyl of not more than 15 carbon atoms and n is from 0 to 3,

with the provisos that (i) the atomic ratio of titanium from the titanium component (1) to aluminum from the aluminumalkyl component (2) is from 1:10 to 1:500, (ii) the molar ratio of aluminumalkyl component (2) to silane component (3) is from 1:0.01 to 1:0.5 and (iii) from 0.05 to 2 kg of polymer are produced per millimole of the aluminumalkyl component (2), and then

(B) in a second polymerization zone, a mixture of propylene and ethylene is polymerized with the propylene homopolymer present in the reaction mixture obtained in the first polymerization zone by feeding in the said reaction mixture, wherein

(α)

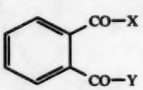
the titanium component (1) used is one which is obtained by a method in which first

(1.1) in a first stage (I) a carrier is prepared from (Ia) a finely divided silica gel which has a particle diameter of from 1 to 1,000 μm, a pore volume of from 0.3 to 5 cm^3/g and a surface area of from 100 to 1,000 m^2/g, is of the formula $SiO_2 \cdot a\ Al_2O_3$, where a is from 0 to 2, and has a moisture content such that it loses from 1 to 20% by weight, based on the initial total weight of the silica gel, of water at 1000° C. in the course of 0.5 hour, (Ib) an organomagnesium compound of the formula MgR^3R^4, where R^3 and R^4 are each C_2–C_{10}-alkyl, and (Ic) a gaseous chlorinating agent of the formula ClZ, where Z is Cl or H, by a method in which first

(1.1.1) in a first sub-stage, in a liquid inert hydrocarbon, with constant thorough mixing at from 10° to 120° C., the finely divided silica gel (Ia) and the organomagnesium compound (Ib) are combined, from 1 to 10 molar parts of the organomagnesium compound (Ib) being used per 10 molar parts of silicon of the silica gel (Ia), and the combined substances are kept at from 20° to 140° C., for from 0.5 to 5 hours, then

(1.1.2) in a second sub-stage, with constant thorough mixing at from −20° to +80° C., the gaseous chlorinating agent (Ic) is passed into the mixture obtained from the first sub-stage, from 2 to 40 molar parts of the chlorinating agent (Ic) being used per molar part of the organomagnesium compound (Ib), the entire mixture is left at a temperature in the stated range for from 0.5 to 5 hours and the resulting solid-phase product, ie. the carrier (I), is isolated with removal of the liquid phase, thereafter

(1.2) in a second stage, a solid-phase intermediate is prepared from (I) the carrier obtained in the first stage, (II) a C_1–C_8-alkanol, (III) titanium tetrachloride and (IV) a phthalic acid derivative of the formula



where X and Y together are oxygen or X and Y are each chlorine or C_1–C_{10}-alkoxy, by a method in which first

(1.2.1) in a first sub-stage, in a liquid inert hydrocarbon, with constant thorough mixing at room temperature, the carrier I) and the alkanol (II) are combined, from 1 to 5 molar parts of the alkanol (II) being used per molar part of magnesium of the carrier (I), and the combined substances are kept at from 20° to 140° C. for from 0.5 to 5 hours, then

(1.2.2) in a second sub-stage, with constant thorough mixing at room temperature, the titanium tetrachloride (III) is introduced into the reaction mixture resulting from the first sub-stage, from 2 to 20 molar parts of the titanium tetrachloride (III) being used per molar part of magnesium of the carrier (I), the combined substances are kept at from 10° to 150° C. for from 0.5 to 5 hours, and the resulting solid-phase intermediate is isolated with removal of the liquid phase,

with the proviso that the phthalic acid derivative (IV) is introduced in the course of one or both of the substages (1.2.1) and (1.2.2), from 0.01 to 1 molar part of the phthalic acid derivative (IV) being used per molar part of magnesium of the carrier (I), then

(1.3) in a third stage, the solid-phase intermediate obtained from the second stage is subjected, at from 100° to 150° C., for from 0.2 to 5 hours, to a single-stage, multistage or continuous extraction with titanium tetrachloride or a mixture of titanium tetrachloride and an alkylbenzene of not more than 12 carbon atoms, which contains not less than 5% by weight of titanium tetrachloride, a total of from 10 to 1,000 parts by weight of the extracting agent being used per 10 parts by weight of the solid-phase intermediate obtained from the second stage, and finally

(1.4) in a fourth stage, the solid-phase product formed in the third stage is washed with a liquid inert hydrocarbon, until the hydrocarbon contains less than 2% by weight of titanium tetrachloride, and the titanium component (1) is thus obtained, and

(β)

polymerization is carried out by a method in which

(a) in the first polymerization zone, the reaction is carried out under a total pressure of from 20 to 40 bar and at from 60° to 90° C., with the proviso that the mean residence time of the polymer is from 1.5 to 5 hours,

(b) in the second polymerization zone, the reaction is carried out under a total pressure of from 7 to 25 bar and at from 40° to 7020 C., with the proviso that the ratio of the propylene partial pressure to the ethylene partial pressure is from 100:20 to 100:120,

(c) the total pressure in the first polymerization zone is kept at least 7 bar higher than the total pressure in the second polymerization zone,

(d) the ratio of the propylene converted into polymer in the first polymerization zone to the weight of the propylene-/ethylene mixture converted into polymer in the second polymerization zone is from 100:40 to 100:150, and

(e) the mean residence time of the polymer in the second polymerization zone is equal to the mean residence time of the polymer in the first polymerization zone multiplied by 0.8–1.2 times the quotient of the amount of polymer discharged hourly from the first polymerization zone to the amount of polymer discharged hourly from the second polymerization zone.

4,977,211

WATER-ABSORPTIVE RESIN COMPOSITION

Shuhei Doi, and Shunichi Ohnishi, both of Mie, Japan, assignors to Mitsubishi Pertochemical Co., Ltd., Tokyo, Japan

Filed Jul. 29, 1988, Ser. No. 225,733

Claims priority, application Japan, Jul. 30, 1987, 62-191096

Int. Cl.[5] C08L *3/04, 23/16, 23/04, 23/10*

U.S. Cl. 525—54.31 **7 Claims**

1. A water-absorptive resin composition, which comprises:

(A) 5 to 95% by weight of a water-absorptive resin selected from the group consisting of an alkali metal polyacrylate

and an alkali metal salt of starch/acrylic acid graft copolymer and 95 to 5% by weight of (B) a polyolefin resin and (C) an ethylene/a-olefin copolymer rubber, based on the total contents of said components (A), (B) and (C), wherein the content of said component (C) amounts to 20 to 80% by weight based on the total contents of said components (B) and (C).

4,977,212

ADHESIVE RESIN COMPOSITION, LAMINATED MATERIAL USING IT AND RESIN COMPOSITION CONTAINING IT

Toshiyuki Akazawa, Kurashiki; Takuji Okaya, Nagaokakyo; Takashi Inoue, Yokohama, and Toshitaka Kobayashi, Funabashi, all of Japan, assignors to Kuraray Co., Ltd., Okayama and Nippon Petrochemicals Co., Ltd., Tokyo, both of, Japan

Division of Ser. No. 13,827, Feb. 12, 1987, Pat. No. 4,810,755. This application Jul. 20, 1988, Ser. No. 221,663

Claims priority, application Japan, Feb. 25, 1986, 61-41038; Feb. 25, 1986, 61-41039

Int. Cl.[5] C08L *29/04, 51/06, 69/00*

U.S. Cl. 525—57 **11 Claims**

1. A resin composition which comprises:

(A) (a) metal containing composition consisting of (i) an ethylene-acrylate, ethylene-methacrylate or ethylene-vinyl acetate copolymer containing from 5 to 45% by weight acrylate or methacrylate component content or from 5 to 50% by weight vinyl acetate component content, said copolymer being grated with 0.01 to 6% by weight of an ethylenic unsaturated carboxylic acid or its acid anhydride; and (ii) 0.02 to 0.6 equivalents of the ethylenic unsaturated carboxylic acid or its acid anhydride or a periodic table group Ia or IIa metal hydroxide, oxide or salt or (b) a blend of said metal containing composition (a) with ethylene-acrylate, ethylene-methacrylate or ethylene-vinyl acetate copolymer wherein said metal containing composition (a) constitutes 1 to 60% by weight of said blend;

(B) a saponified ethylene-vinyl acetate copolymer resin having an ethylene component content of 20–55 mole % and a saponification degree of not less than 90%; and

(C) a hydrophobic thermoplastic resin which is other than (A) or (B) and which has heat melt moldability;

the amount of said ingredient (A) being 0.1 to 50 parts by weight per 100 parts by weight of the sum of the weights of said ingredients (B) and (C).

4,977,213

MOULDING COMPOSITIONS COMPRISED OF SEMIRIGID, FATTY ACID COPOLYAMIDES, ELASTOMERS AND OPTIONALLY CONVENTIONAL POLYAMIDES

Bruno Giroud-Abel, and Jean Goletto, both of Ecully, France, assignors to Rhone-Poulenc Specialites Chimiques, Courbevoie, France

Continuation of Ser. No. 529,855, Sep. 6, 1983, abandoned. This application Jun. 8, 1987, Ser. No. 59,204

Claims priority, application France, Sep. 6, 1982, 82 15271

Int. Cl.[5] C08L *77/00, 75.04, 83/04*

U.S. Cl. 525—66 **13 Claims**

1. A polyamide-based molding composition having high flexibility and resilience even at low temperatures, comprising:

(1) a semirigid copolyamide prepared from (a) a fatty acid dimer, hexamethylenediamine and caprolactam or (b) a fatty acid dimer, adipic acid and hexamethylenediamine wherein the dimeric acids are prepared by polymerization of mixtures comprising a major proportion of monomeric fatty acids having from 16 to 20 carbon atoms and a minor proportion of monomeric fatty acids having from 8 to 15 carbon atoms, 21 to 24 carbon atoms or a combination thereof;

(2) at least one elastomer comprising recurring units compatible with or reactive with the copolyamide (1) and selected from among:

(a) olefinic copolymers consisting essentially of an aliphatic α-olefin containing from 2 to 6 carbon atoms and at least one α,β-unsaturated monocarboxylic or dicarboxylic acid comonomer containing from 3 to 8 carbon atoms, a lower alkyl ester thereof, or an anhydride thereof;

(b) olefinic copolymers consisting essentially of a conomoner containing carboxyl groups, a comonomer containing carboxylate groups or a combination thereof, ethylene and at least one α-olefin having from 3 to 6 carbon atoms;

(c) olefinic copolymer consisting essentially of a comonomer containing carboxyl groups, a comonomer containing carboxylate groups or a combination thereof, ethylene, at least one α-olefin having from 3 to 6 carbon atoms and at least one non-conjugated aliphatic diene containing at least 5 carbon atoms;

(d) copolyester-amides comprising (i) an acid compound containing 1 to 100 mole % of a diacid or derivative thereof having from 15 to 60 carbon atoms and 0 to 99 mole % of at least one other difunctional comonomer selected from among diacids, aminoacids, hydroxyacids or other ester- or amide-forming derivatives thereof, such comonomers having a number of carbon atoms at most equal to 12, (ii) a dihydroxylic compound which can be a linear, branched or cyclic diol having from 2 to 8 carbon atoms, a macromolecular dihydroxlic compound having a molecular weight ranging from 500 to 5,000 or a combination thereof, and (iii) an amine compound comprising at least one diamine, at least one aminoalcohol having a number of carbon atoms at most equal to 25 or a combination thereof, with the proviso that the compound (iii) may be omitted where the acid compound (i) already comprises an amino function:

(e) polyurethanes comprising (i) an aliphatic polyester, an aliphatic polyether having a terminal hydroxyl group and having a molecular weight ranging from 500 to 4,000 or a combination thereof, (ii) an aliphatic diol containing 2 to 8 carbon atoms and (iii) an aromatic diisocyanate;

(f) organopolysiloxane and polyurethane block copolymers comprising a reaction product of (i) and (ii) which are different and where (i) is a polysiloxane macrodiol or polysiloxane macrodiisocyante which comprises a reaction product of an α, ω-hydrogenopolysiloxane of the formula:

in which n is a number ranging from 10 to 80 and the substituents R, which may be identical or different, represent methyl, vinyl or phenyl groups, with a primary ethylenically unsaturated monoalcohol or ethylenically unsaturated monoisocyanate and (ii) is a low molecular weight diol and a low molecular weight diisocyanate;

(g) copolymers of unsaturated monomers, having at least one elastomeric phase and comprising particulates of a size ranging from 0.05 to 1.5 μm prepared by emulsion polymerization of an alkyl acrylate, an alkyl methacrylate or a conjugated aliphatic diene, and at least one unsaturated comonomer which bears a carboxylic acid group or derivative thereof, amine group or derivative thereof, nitrile group, sulfonic acid group or derivative thereof; and

(3) a conventional polyamide in an amount ranging from 10 to 50% by weight of the combination of the semirigid copolyamide (1) and the conventional polyamide (3).

4,977,214

CURABLE EPOXIDE RESIN COMPOSITIONS

Madan M. Bagga, Cambridge, England, assignor to Ciba-Geigy Corporation, Ardsley, N.Y.

Filed Oct. 12, 1989, Ser. No. 420,193

Claims priority, application United Kingdom, Oct. 18, 1988, 8824391

Int. Cl.[5] C08G 59/68

U.S. Cl. 525—109 12 Claims

1. A curable composition comprising

(A) a polyglycidyl ether of a polyhydric phenol,

(B) a polyglycidyl ether of a polyhydric alcohol,

(C) a nitrogen-containing latent hardener for epoxide resins, and

(D) as cure accelerator dispersed as a powder in the composition, a solid solution of a polymeric phenol with an aliphatic polyamine having two or more amine groups, each of the amine groups being tertiary and at least two of the amine groups being dimethylamino groups.

4,977,215

CARBOXYLATED RUBBER PARTICLES AS TOUGHENERS FOR FIBER REINFORCED COMPOSITES

Hugh C. Gardner, and Richard H. Newman-Evans, both of Somerville, N.J., assignors to Amoco Corporation, Chicago, Ill.

Division of Ser. No. 249,597, Sep. 26, 1988. This application Mar. 21, 1990, Ser. No. 496,776

Int. Cl.[5] C08L 33/02

U.S. Cl. 525—119 6 Claims

1. A curable matrix resin formulation comprising (a) from 99 to about 75 wt % of an epoxy resin formulation and (b) from 1 to about 25 wt % particles having a smallest dimension in the range of from 1 to about 75 microns comprising a cross-linked carboxylated rubber selected from the group consisting of carboxylated diene rubbers and carboxylated acrylic rubbers, said carboxylated rubber having from 0.1 to 5 wt % carboxyl functionality and a Tg above 15° C.

4,977,216

TOUGHENED NYLONS CHARACTERIZED BY LOW MOLD DEPOSIT

Andri E. Elia, Vienna, W. Va., assignor to E. I. Du Pont de Nemours and Company, Wilmington, Del.

Continuation of Ser. No. 237,169, Aug. 29, 1988, abandoned. This application Apr. 5, 1990, Ser. No. 506,490

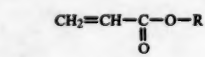
Int. Cl.[5] C08L 77/00

U.S. Cl. 525—183 11 Claims

1. A thermoplastic polyamide composition consisting essentially of

(a) 75–90 weight percent of a thermoplastic polyamide selected from nylon 66, nylon 6 and nylon 66/6 blends where the blends contain not more than 50 weight percent nylon 6, and where the polyamide has a number average molecular weight of at least 5,000; and

(b) 10–25 weight percent of an ionomer of ethylene, E/X/Y, where E is ethylene from 45–94 weight percent, X is from 1–20 weight percent of unsaturated carboxylic acid, wherein the unsaturated carboxylic acid is selected from the group consisting of acrylic acid, methacrylic acid, maleic acid, fumaric acid, itaconic acid, and half esters of maleic, fumaric and itaconic acid, and Y is from 5–35 weight percent of a softening comonomer, wherein the softening comonomer is of the formula



where R is selected from the group consisting of n-propyl, n-butyl, n-pentyl,n-hexyl, n-heptyl, n-octyl, n-nonyl, 2-ethylhexyl, 2-methoxyethyl, 2-ethoxyethyl, 3-methoxypropyl, 3-methoxybutyl and 3-ethoxypropyl, and further wherein the ionomer has from about 3 to about 90 percent of the carboxylic acid groups neutralized with metal ions selected from groups Ia,IIa, IIb, IIIa, IVa, Vib and VIII of the Periodic Table of the Elements.

4,977,217

POLYESTERS HAVING IMPROVED IMPACT STRENGTH

Ronald H. Sunseri, and Michael W. O'Rourke, both of Baton Rouge, La., assignors to Copolymer Rubber & Chemical Corporation, Baton Rouge, La.

Division of Ser. No. 105,455, Oct. 1, 1987, abandoned, which is a continuation of Ser. No. 800,333, Nov. 21, 1985, abandoned. This application Jul. 1, 1988, Ser. No. 214,861

Int. Cl.[5] C08F 255/06

U.S. Cl. 525—286 16 Claims

1. The product for blending with a polyester resinous material to improve its unnotched Izod impact Strength at the knit-line and to improve the notched Izod impact strength of the polyester comprising an interpolymer of ethylene, monoolefin having 3–16 carbon atoms and a polyene, in which the interpolymer is grafted with an ester of methacrylic acid or acrylic acid having an epoxide functionality on the alkoxy portion and in which the previously grafted interpolymer is reacted with a multifunctional compound selected from the group consisting of a diamine and a diacid or its anhydride to provide a cross-linking limited primarily to the rubber phase.

4,977,218

CARBOXYLATED RUBBER PARTICLES AS TOUGHENERS FOR FIBER REINFORCED COMPOSITES

Hugh C. Gardner, and Richard H. Newman-Evans, both of Somerville, N.J., assignors to Amoco Corporation, Chicago, Ill.

Filed Sep. 26, 1988, Ser. No. 249,597

Int. Cl.[5] C08F 8/00

U.S. Cl. 525—329.3 6 Claims

1. Particles having a smallest dimension in the range of from 1 to about 75 microns comprising a cross-linked carboxylated rubber selected from the group consisting of carboxylated diene rubbers and carboxylated acrylic rubbers, said carboxylated rubber having from 0.1 to 5 wt% carboxyl functionality and a Tg above 15° C., said particles being formed by spray-drying.

4,977,219

LOW TEMPERATURE CROSSLINKING OF WATER-BORNE RESINS

Stuart L. Watson, Jr., South Charleston, W. Va., assignor to Union Carbide Chemicals and Plastics Company, Inc., Danbury, Conn.

Continuation of Ser. No. 816,976, Jan. 7, 1986, abandoned, which is a continuation of Ser. No. 691,378, Jan. 15, 1985, abandoned, which is a continuation of Ser. No. 469,435, Feb. 24, 1983, abandoned. This application Sep. 9, 1986, Ser. No. 904,835

Int. Cl.[5] C08F 8/30

U.S. Cl. 525—329.5 36 Claims

1. Method for crosslinking water-borne, carboxyl-containing latex resins or neutralized carboxylated water-soluble organic resins which comprises:

(a) blending said resins at ambient temperatures with about 0.5 to about 30 parts per 100 parts by weight of said resins of an emulsified or water-soluble polyfunctional polycarbodiimide derived from the reaction of mono-di- and tri-cycloaliphatic or saturated aliphatic isocyanates wherein the cycloaliphatic moieties contain from 5 to about 7 carbons and can be substituted with alkyl having 1 to about 6 carbons, and oxygen and the saturated ali-

phatic moieties contain from 1 to about 18 carbons wherein the mono- and triisocyanates are optional, and

(b) allowing volatilization of certain formulated materials resulting in a crosslinked product.

4,977,220

EPOXY END-CAPPED DIOLEFIN DERIVATIVES, POLYMERS THEREOF, AND PROCESSES FOR FORMING SAME

Thomas K. Dougherty, Playa del Rey; Susan L. Oldham, Torrance, and William E. Elias, Redondo Beach, all of Calif., assignors to Hughes Aircraft Company, Los Angeles, Calif.

Division of Ser. No. 274,676, Nov. 21, 1988, abandoned, which is a continuation-in-part of Ser. No. 118,592, Nov. 9, 1987, abandoned. This application Feb. 20, 1990, Ser. No. 485,925

Int. Cl.[5] C08G 59/02, 59/22; C08C 19/06, 19/40

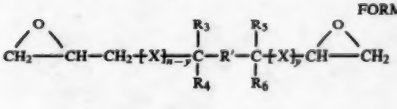
U.S. Cl. 525—332.3 8 Claims

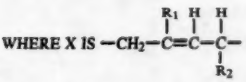
1. A method for forming a cured polymer having epoxy-derived linkages at regular intervals along the chain of said polymer, comprising the steps of:

(a) reacting a 1,3-diolefin compound having 4 to 12 carbon atoms per molecule with a chosen difunctional initiator comprising anionic reactive sites, wherein the molar ratio of said initiator to said diolefin compound is within the range of about 1:4 to 1:15, to form an intermediate living oligomer comprising two anionic end groups;

(b) reacting said intermediate living oligomer with a chosen halohydrin compound to epoxidize said two anionic end groups and form an epoxy end-capped oligomer having Formula I below:

FORMULA I





WHERE X IS $-CH_2-C(R_1)=C(H)-C(H)(R_2)-$

R′ = ALIPHATIC, CYCLOALIPHATIC, OR AROMATIC GROUP HAVING 2 TO 20 C

R_1, R_2, R_3, R_4, R_5, OR R_6 IS H OR ALKYL

n = 1 TO 10

y = O TO (n − 1)

(c) reacting said epoxy end-capped oligomer with an epoxy curing agent to polymerize said oligomer and form said polymer having an epoxy equivalent weight of about 400–1200.

4,977,221

POWDERS OF TETRAFLUOROETHYLENE COPOLYMER AND PROCESS FOR PREPARING THE SAME

Tatsushiro Yoshimura; Nobuyuki Tomihashi, both of Takatsuki, and Shuhei Simasaki, Itami, all of Japan, assignors to Daikin Industries, Ltd., Osaka, Japan

Division of Ser. No. 135,217, Dec. 21, 1987, Pat. No. 4,898,779. This application Dec. 28, 1989, Ser. No. 458,480

Claims priority, application Japan, Dec. 22, 1986, 61-307131

Int. Cl.[5] C08F 8/22

U.S. Cl. 525—356 3 Claims

1. A process for preparing powders of tetrafluoroethylene copolymers having a non-spherical particle shape, a frictional packing ratio of 20 to 100% and an average particle size of 5 to 500 μm, which comprises producing a sheet of a tetrafluoroethylene/hexafluoropropylene copolymer or a tetrafluoroethylene/fluoro(vinyl ether) copolymer with rolls, and pulverizing the sheet.

4,977,222

CROSS-LINKING OF THERMOSETTING RESINS BY MEANS OF HEATING WITH SATURATED PERFLUOROPOLYETHER VAPOR IN THE PRESENCE OF A SECONDARY FLUID

Gianangelo Bargigia; Alberto Re, both of Milan; Luigi Corbelli, Ferrara, all of Italy; Ken Johns, Ashford, Great Britain; Luciano Flabbi, and Padmanabhan Srinivasan, both of Milan, Italy, assignors to Ausimont S.p.A., Italy

Filed Mar. 11, 1988, Ser. No. 167,125

Claims priority, application Italy, Mar. 16, 1987, 19709 A/87; Sep. 22, 1987, 41010 A/87

Int. Cl.[5] C08F 8/20

U.S. Cl. 525—359.3 4 Claims

1. A process for cross-linking thermosetting resins selected from the group consisting of epoxy resins, unsaturated polyester resins, urethanic resins, acrylic resins, phenolic resins and alkyd melaminic resins or hot curable elastomers selected from the group consisting of ethylene/propylene copolymer, ethylene/propylene/diene terpolymer, vinylidene fluoride/-hexafluoropropene copolymer and terpolymer $CH_2=CF_2/C_3F_6/C_2F_4$ or polymer thick films, carried out by heating the material or the article comprising the resin, the elastomer or the polymer thick film by means of a saturated vapor of a commercial-type perfluoropolyether selected from:

(1) $A'O(C_3F_6O)_m(CFXO)_n—A$, where X is equal to —F, $—CF_3$; A and A′, like or different from each other, may be $—CF_3$, $—C_2F_5$, $—C_3F_7$; units C_3F_6O and CFXO are statistically distributed along the perfluoropolyether chain, m and n are integers wherein n is O or the m/n ratio is equal to 2 when n is different from O;

(2) $C_3F_7O(C_3F_6O)_m—B$, wherein B is $—C_2F_5$ or C_3F_7, and m is a positive integer;

(3) $C_3F_7O(C_3F_6O)_m—CF(CF_3)—_2$, wherein m is a positive integer;

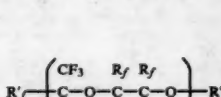
(4) $A'O(C_3F_6O)_m(C_2F_4O)_n(CFXO)_q—CF_3A$, wherein A and A′, either the same or different from each other, are $—CF_3$, $—C_2F_5$ or $—C_3F_7$; X is —F, $—CF_3$; m, n and q are integers or zero;

(5) $CF_3O(C_2F_4O)_p(CF_2O)_q—CF_3$, wherein p and q are integers either like or different from each other, such that the p/q ratio ranges from 0.5 to 2;

(6) $A—(CF_2CF_2)_n—A'$, wherein A and A′, like or different from each other, are $—CF_3$ or $—C_2F_5$, and n is a positive integer;

(7) $A—(CXYCF_2CF_2)_m—A'$, wherein A and A′, like or different from each other, are $—CF_3$, $—C_2F_5$ or $—C_3F_7$; X and Y are H or P, either like or different from each other, and m is an integer;

(8)



wherein R′$_f$ is a perfluoroalkyl, n is at least 8, and R$_f$ is F or a perfluoroalkyl;

said perfluoropolyether consisting of a mixture of chemically similar products, exhibiting a boiling range ≦12° C. determined by ASTM D. 1078 and having perfluoroalkyl end groups and an average boiling point from 120° C. to 270° C., corresponding to the temperature necessary for the cross-linking.

4,977,223

THERMOSET RIGID ROD MOLECULAR COMPOSITE SYSTEM

Fred E. Arnold, Centerville; Thaddeus E. Helminiak, Dayton; Donald R. Wiff, Akron; Loon S. Tan, Centerville, all of Ohio; Wen F. Hwang, Midland, Mich., and Hoe Chuah, Centerville, Ohio, assignors to The United State of America as represented by the Secretary of the Air Force, Washington, D.C.

Filed Feb. 2, 1989, Ser. No. 307,112

Int. Cl.[5] C08L *77/00;* **D01F** *1/00, 11/00*

U.S. Cl. 525—432 **2 Claims**

1. A method for the preparation of a composite film or fiber which comprises the steps of:

(a) dissolving about 10 to 60 weight percent of an aromatic heterocyclic right-rod polymer, about 15 to 35 weight percent of a flexible coil-like thermoplastic polymer and about 20 to 60 weight percent of a thermosetting resin in a solvent selected from the group consisting of concentrated sulfuric acid, m-cresol and methanesulfonic acid, at a concentration about 0.1 to 1.0 weight percent less than the critical concentration point of the solution;

(b) extruding the solution resulting from step (a) into a coagulation bath for removing said solvent;

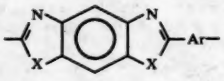
(c) collecting the extruded film or fiber resulting from step (b) and washing the extruded film or fiber to remove further solvent;

(d) drying the wet film or fiber from step (c) at a temperature of less than about 30°C;

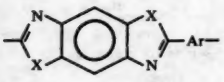
(e) hot drawing the dry film or fiber by heating the same at a temperature above the Tg of said thermoplastic polymer and below the Tpoly of said thermosetting resin; and

(f) cooling the composite to ambient temperature;

wherein said aromatic heterocyclic rigid-rod polymer has repeating units selected from the group consisting of

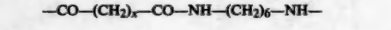


and

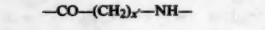


wherein X is NH, Nϕ, O or S, wherein ϕ is phenyl or a substituted phenyl group, and wherein Ar is

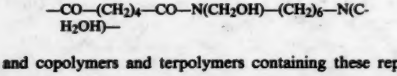
wherein said thermoplastic polymer is selected from the group consisting of polyamides and polyphenylquinoxalines, wherein said polyamides comprise repeating units selected from the group consisting of



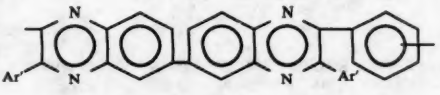
wherein x is 4 or 8,



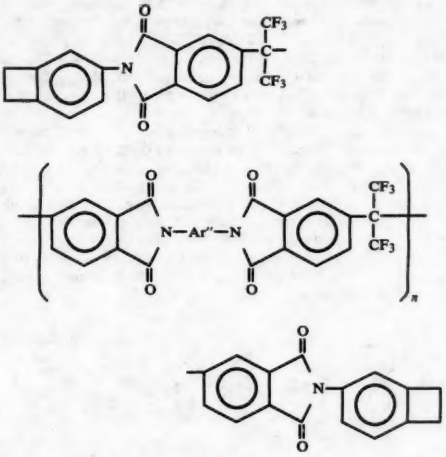
wherein X' is 5 to 8,
and



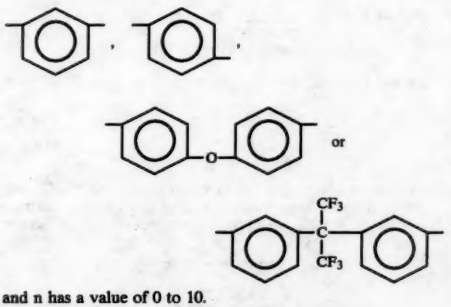
and copolymers and terpolymers containing these repeating units; and wherein said polyphenylquinoxaline has repeating units of the formula



wherein AR' is a phenyl or phenoxyphenyl group; and wherein said thermosetting resin is a bis(benzocyclobutene)-terminated imide oligomer of the formula



wherein AR'' is



and n has a value of 0 to 10.

4,977,224

PROCESS FOR THE PREPARATION OF COPOLY(ARYLENE SULFIDE) HAVING A DECREASED AMOUNT OF DISULFIDE RADICALS

Joseph J. Watkins; David R. Fagerburg, both of Kingsport; Paul B. Lawrence, Blountville, and Mark Rule, Kingsport, all of Tenn., assignors to Eastman Kodak Company, Rochester, N.Y.

Filed Nov. 17, 1989, Ser. No. 437,701

Int. Cl.[5] C08G *75/10, 75/14*

U.S. Cl. 525—471 **7 Claims**

1. A process for preparation of a copoly(arylene sulfide)

which has a decreased amount of disulfide radicals and corresponds to the structure

$$[(-A-S-)_{1-x}(-A-S-S-)_x]_n$$

wherein

A is a divalent substituted or unsubstituted aromatic radical,

x is in the range of 0.45 to 0 and n is at least 50,

comprising contacting a copoly(arylene sulfide) corresponding to the structure

$$[(-A-S-)_{1-x}(-A-S-S-)_x]_n$$

wherein

A is a divalent substituted or unsubstituted aromatic radical,

x is in the range of 0.50 to 0.01 and

n is at least 25,

in the melt phase at a temperature in the range of 257°-350° C. with a diiodoaromatic compound corresponding to the structure

I-A-I

wherein

A is a divalent substituted or unsubstituted aromatic radical.

4,977,225

PROCESS FOR PREPARATION OF ACRYLONITRILE POLYMERS WITH LOW K VALUE

Tibor Krakkay, Munich; Tatjana Poggi, Saal, and Ernst Schubert, Kelheim/Donau, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Continuation of Ser. No. 11,744, Jul. 6, 1987, abandoned, which is a division of Ser. No. 839,288, Mar. 13, 1986, Pat. No. 4,673,721, which is a continuation of Ser. No. 636,965, Aug. 5, 1984, abandoned, and a continuation-in-part of Ser. No. 832,453, Feb. 21, 1986, Pat. No. 4,683,286. This application Oct. 28, 1988, Ser. No. 266,244

Claims priority, application Fed. Rep. of Germany, Aug. 5, 1983, 3328276

Int. Cl.[5] C08F 4/40

U.S. Cl. 526—93 2 Claims

1. A process for the preparation of a low molecular weight homopolymer or copolymer of acrylonitrile which contains at least 60% by weight of acrylonitrile units and up to 40% by weight of units which can be copolymerized with acrylonitrile by continuous or semi-continuous precipitation polymerization by means of a redox system in an aqueous medium at a pH value of 1.5 to 4.0, which comprises carrying out the polymerization at temperatures from 30° to 65° C. and a monomer concentration of 12 to 30% by weight, based on the amount of water and monomers metered in during the same unit of time, the redox system consisting of a persulfate catalyst in a concentration of 0.5 to 2.5% by weight, calculated as $S_2O_8^{2-}$, a sulfite activator in a concentration of 5 to 25% by weight, calculated as $S_2O_5^{2-}$, and iron ions as an accelerator in a concentration of 6×10^{-4} to 2×10^{-2}% by weight, in each case based on the amount of water metered in during the same unit of time, the weight ratio of persulfate catalyst to pyrosulfite activator being adjusted to 1:2 to 1:30, the average residence time of the monomers in the reaction mixture being 1.5 to 2.5 hours and the values for the concentrations of monomers, catalyst, activator and accelerator and the catalyst/activator ratio and the residence time being matched with one another such that the resulting polymer has a Fikentscher K value of 34 to 15.

4,977,226

PROCESS FOR PRODUCTION OF MOLDED ARTICLE OF NORBORNENE POLYMER

Tomoo Sugawara, 481, Miyauchi, Nakahara-ku, Kawasaki-shi, Kanagawa, and Motoyuki Yamato, Ooiso Koma Haitsu 2-232, 2-21, Koma, Ooiso-cho, Naka-gun, Kanagawa, both of Japan

Filed Sep. 12, 1988, Ser. No. 242,847

Claims priority, application Japan, Sep. 25, 1987, 62-238920

Int. Cl.[5] C08F 2/02, 32/04, 32/08

U.S. Cl. 526—122 21 Claims

1. Process for production of a molded article of a norbornene polymer which comprises mixing a starting reaction liquid A containing a cocatalyst component of a metathesis catalyst system with a starting reaction liquid B containing a catalyst component of a metathesis catalyst system to form a molding mixture; supplying the mixture into a mold; polymerizing by bulk ring-opening polymerization the molding mixture in the mold until the molded articles is formed; and removing the article from the mold; wherein at least one norbornene monomer having bicyclic or higher cyclic structure, and a liquid viscosity modifier are incorporated into at least one of the starting reaction liquids, the viscosity modifier is a liquid product obtained by ring-opening polymerization of the norbornene monomer having bicyclic or higher cyclic structure, or a mixture thereof, which is used to modify the viscosity of at least one of the starting reaction liquids.

4,977,227

LIGNOSULFONIC GRAFT COPOLYMER AS A CEMENT DISPERSANT

Shin'ichi Negami, Gotenba; Hiroshi Nomachi; Toru Nemoto, both of Chigasaki; Yoshio Tanaka, Komae, and Akira Ohta, Chigasaki, all of Japan, assignors to Sandoz Ltd., Basle, Switzerland

Filed Nov. 28, 1988, Ser. No. 276,727

Claims priority, application Japan, Dec. 1, 1987, 62-301432

Int. Cl.[5] C08H 5/02; C09K 7/00; C09D 4/00

U.S. Cl. 527—400 4 Claims

1. A cement dispersant comprising a lignosulfonic graft copolymer of lignosulfonic acid or its salt and at least one acrylic or vinylic monomer, the monomer having functional groups comprising carboamide, N-sulfoalkylcarboamide, carboxyl, carboalkoxy, carbosulfoalkoxy, cyano, and sulfophenyl groups, with the lignosulfonic acid graft polymer having a molecular weight distribution of from 5×10^2 to 5×10^6.

4,977,228

CURABLE POLYMER COMPOSITION

Hiroshi Wakabayashi; Hisami Iwakiri; Kazuhiko Tamai, and Katsuhiko Isayama, all of Kobe, Japan, assignors to Kanegafuchi Chemical Industry Co., Ltd., Osaka, Japan

Filed Mar. 17, 1989, Ser. No. 325,256

Claims priority, application Japan, Mar. 17, 1988, 63-63809

Int. Cl.[5] C08G 77/06

U.S. Cl. 528—12 9 Claims

1. A curable polymer composition comprising:

(A) an alkyl (meth)acrylate base polymer having at least one silicon atom bonded to a hydroxy group or a hydrolyzable group and which is cross linkable through formation of a siloxane bond,

(B) an oxyalkylene base polymer having at least one silicon atom bonded to a hydroxy group or a hydrolyzable group and which is cross linkable through formation of a siloxane bond,

(C) a silicon-containing compound having three or four hydrolyzable groups bonded to the silicon atom,

(D) a silicon-containing compound having two hydrolyzable groups bonded to the silicon atom, and

(E) a curing accelerator

wherein the components (C), (D) and (E) are contained in amounts of 0.01 to 30 parts by weight, 0.1 to 30 parts by weight

and 0.01 to 10 parts by weight, respectively, per 100 parts by weight of the total amount of the polymers (A) and (B).

4,977,229

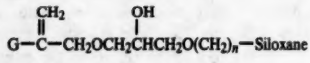
POLYMERIC COMPOSITIONS FOR OPTICAL DEVICES

Doris A. Culberson, Baton Rouge, La., and Lon J. Mathias, Hattiesburg, Miss., assignors to The University of Southern Mississippi, Hattiesburg, Miss.

Filed Sep. 22, 1988, Ser. No. 247,947
Int. Cl.[5] C08C 77/26; C08F 30/08
U.S. Cl. 528—26 **8 Claims**

1. As a new article of manufacture a contact or intraocular lens formed from a polymer formed by polymerizing

(a) one or more monomers having the formula



wherein:

G is an electron withdrawing organic radical selected from the group of ROC(O)—, NC—, O_2N—, RSO_2—, RSO—, RPO_2—, $(R)_2NC(O)$—, RHNC(O)—, $H_2NC(O)$— or RC(O)— in which each expression of R is an independently selected alkyl group containing from 1 to 6 carbon atoms,

Siloxane is a mono- or poly-siloxane group which is linear or branched and

n is an integer from 1 to 6,

(b) one or more monomeric crosslinking agents selected from the group consisting of diacrylates, vinyl acrylates, allylacrylates, divinyl benzene, diallylesters, divinyl esters, triallyl isocyanurate, hexamethylene bisacrylamide, di(alkene tertiary amine) compounds, diacrylate polysiloxane and mixtures thereof,

and optionally,

(c) an ester of a monohydric alkanol having from 1 to 20 carbon atoms or a monohydric fluorinated alkanol having from 1 to 20 carbon atoms and an acid selected from the group consisting of acrylic or methacrylic acids.

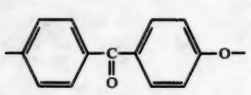
4,977,230

HEAT-RESISTANT FILM OR SHEET

Seiichi Nozawa; Shigeo Utsumi, and Michio Nakata, all of Kanagawa, Japan, assignors to Mitsubishi Chemical Industries Limited and Diafoil Company, Limited, both of Tokyo, Japan

Continuation of Ser. No. 217,115, Jul. 11, 1988, abandoned, which is a continuation of Ser. No. 803,758, Nov. 7, 1985, abandoned. This application Feb. 5, 1990, Ser. No. 476,146
Claims priority, application Japan, Mar. 7, 1984, 59-41955; Mar. 7, 1984, 59-41956; Mar. 7, 1984, 59-41957; Mar. 9, 1984, 59-45274; Mar. 9, 1984, 59-45275; Sep. 5, 1984, 59-186054
Int. Cl.[5] C08G 8/02, 65/38
U.S. Cl. 528—125 **8 Claims**

1. A heat resistant film or sheet obtained by treating an unsaturated film or sheet produced by melt extruding polyether ketone polymer or copolymer having a repeating unit represented by the general formula (I):



(I)

and having an intrinsic viscosity of at least 0.4 dl/g, said copolymer comprising up to 40 mol % of a copolymerization component, said treatment comprises:

(i) stretching the unstretched film or sheet to at least 3.0 times of the initial length only in a longitudinal direction at from the secondary transition point to 180° C. followed by heat setting the film or sheet at a temperature of from 210° C. to below the melting point of the film or sheet, or

(ii) stretching the unstretched film or sheet in longitudinal and transverse directions both to at least 1.5 times of the initial width at the same time or in any desired order at from the secondary transition temperature to 180° C., wherein a stress at 5% elongation in the stretched direction being at least 13 kg/mm^2, an initial tensile modulus at least in one direction is at least 600 kg/mm^2, and a thermal shrinkage in longitudinal and transverse directions at 180° C. is not more than 4%.

4,977,231

PHENOLIC RESIN CONTAINING A LATENT HARDENING AGENT COMPRISING THE CARBAMATE REACTION PRODUCT OF A CYCLIC

Ted M. McVay, and Gene F. Baxter, both of Lithonia, Ga., assignors to Georgia-Pacific Corporation, Atlanta, Ga.

Filed Apr. 13, 1989, Ser. No. 337,483
Int. Cl.[5] C08G 8/10, 8/28, 14/067
U.S. Cl. 528—142 **27 Claims**

1. A method for curing a phenol-aldehyde resin comprising:

mixing a phenol-aldehyde resin having an aldehyde:phenol molar ratio of at least 1.05 with an effective amount of a curing agent comprising a carbamate reaction product of: (a) a carbonate from the group consisting of alkylene, glycidol, and epoxy resin carbonates; and (b) ammonia;and

curing said resin.

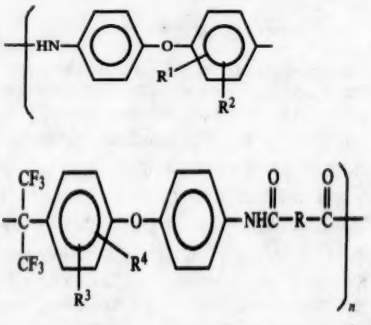
4,977,232

AROMATIC POLYAMIDE FROM 2,2'-BIS(4-(4-AMINO-PHENOXY)PHENYL)HEXAFLUORO PROPANE

Yutaka Maruyama, and Haruhiko Komoriya, both of Kamifukuoka City, Japan, assignors to Central Glass Company, Limited, Ube, Japan

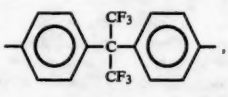
Filed Aug. 3, 1988, Ser. No. 227,532
Claims priority, application Japan, Aug. 4, 1987, 62-193670
Int. Cl.[5] C08G 69/32
U.S. Cl. 528—185 **2 Claims**

1. An aromatic polyamide having a repeating unit structure represented by the formula (I):



(I)

wherein R^1, R^2, R^3 and R^4 are the same or different and each represents a hydrogen atom, an alkyl group having not more than 6 carbon atoms, an alkoxyl group having not more than 6 carbon atoms, a chlorine atom, a fluorine atom or a bromine atom, R is



.

and n is an integer from 2 to 200.

4,977,233

POLYCARBONATE CAPPED WITH PHENOLIC CHAIN TERMINATOR MIXTURE

Masaya Okamoto, and Hiroshi Kurokawa, both of Ichihara, Japan, assignors to Idemitsu Petrochemical Co., Ltd., Tokyo, Japan

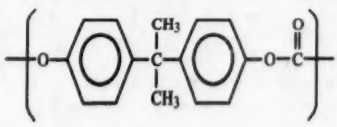
Filed Mar. 23, 1989, Ser. No. 327,710

Claims priority, application Japan, Mar. 28, 1988, 63-071984; Apr. 27, 1988, 63-102615

Int. Cl.[5] C08G *64/14*

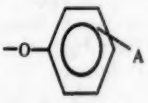
U.S. Cl. 528—198 **3 Claims**

1. A polycarbonate having a principal chain comprising a relating unit represented by the formula:



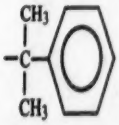
[I]

and (a) substituted phenoxy group represented by the formula:

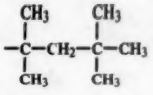


[II]

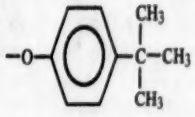
wherein A is α,α-dimethylbenzyl group represented by the formula:



or 1,1,3,3-tetramethylbutyl group represented by the formula:

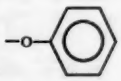


and (b) at least one group selected from the group consisting of p-tert-butylphenoxy group represented by the formula:



[III]

and phenoxy group represented by formula (IV)



[IV]

bonded at the terminals of the molecules in the ratio of (a) 10 to 99 mole percent of the substituted phenoxy group and (b) 90 to 1 mole percent of the at least one group selected from the group consisting of p-tert-butylphenoxy group and phenoxy group.

4,977,234

POLYCYANOARYL ETHER COMPOSITION METHOD FOR PREPARING THE SAME AND USES THEREOF

Shigeru Matsuo; Tomoyoshi Murakami; Thoru Bando, all of Sodegaura, and Kikuo Nagatoshi, Kisarazu, all of Japan, assignors to Idemitsu Kosan Company Limited, Tokyo, Japan

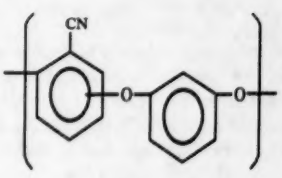
Continuation of Ser. No. 27,629, Mar. 18, 1987, abandoned. This application Dec. 28, 1988, Ser. No. 290,834

Claims priority, application Japan, Mar. 25, 1986, 61-64746; Apr. 10, 1986, 61-81066; Jun. 23, 1986, 61-144918; Jul. 1, 1986, 61-152626

Int. Cl.[5] C08G *65/40*

U.S. Cl. 528—211 **4 Claims**

1. A resinous composition for molding comprising 100 parts by weight of a polycyanoaryl ether consisting essentially of a recurring unit represented by the formula:



(I)

and has a reduced viscosity (ηsp/c) of 0.2 dl/or more at 60° C. in a solution of a concentration of 0.2 g/dl in p-chlorophenol as a solvent, as a main component, and 0.01 to 3 parts by weight of at least one crystallizing nucleator.

4,977,235

POLYARYLATE POLYMERS

Pen-Chung Wang, Houston, Tex., assignor to Shell Oil Company, Houston, Tex.

Continuation-in-part of Ser. No. 314,515, Feb. 23, 1989, Pat. No. 4,910,285. This application Dec. 21, 1989, Ser. No. 454,727

Int. Cl.[5] C08G *8/00*

U.S. Cl. 528—220 **31 Claims**

1. A linear alternating polyarylate polymer comprising moieties of a di(carbonyl)arylene compound of up to 30 carbon atoms alternate with moieties of a 1,6-diaza [4.4] spirodilactam compound having oxyaryl substituents on each spiro nitrogen atom.

4,977,236

TERMINATED COPOLY(ARYLENE SULFIDE) OF LOW MOLECULAR WEIGHT

David R. Fagerburg; Joseph J. Watkins, both of Kingsport; Paul B. Lawrence, Blountville, and Mark Rule, Kingsport, all of Tenn., assignors to Eastman Kodak Company, Rochester, N.Y.

Continuation of Ser. No. 364,757, Jun. 12, 1989, abandoned. This application Dec. 5, 1989, Ser. No. 449,289

Int. Cl.[5] C08G *75/14*

U.S. Cl. 528—226 **7 Claims**

1. A process for producing elemental iodine and a copoly-(arylene sulfide) corresponding to the structure:

wherein A is a divalent substituted or unsubstituted aromatic radical, T is a monovalent aromatic radical, x is in the range of 0.5 to 0.001 and n is an integer from 1 to 100, said process consisting essentially of

(1) reacting at a temperature above about 175° C. a mixture of a diiodoaromatic compound which contributes the divalent radial A and a monoiodo aromatic compound which contributes the monovalent radical T and elemental sulfur to produce the elemental iodine and the copoly(arylene sulfide), and

(2) recovering the elemental iodine.

4,977,237

NEW PROCESS FOR MANUFACTURING UREA/FORMALDEHYDE RESINS

Roger Garrigue, and Jack Lalo, both of Toulouse, France, assignors to Norsolor S.A., Paris La Defense, France

Continuation of Ser. No. 345,279, May 1, 1989, abandoned. This application Nov. 29, 1989, Ser. No. 442,863

Claims priority, application France, Apr. 29, 1988, 88 05746

Int. Cl.[5] C08G *12/12, 14/08*

U.S. Cl. 528—230 **6 Claims**

1. A new process for manufacturing urea/formaldehyde resins, according to which urea and formaldehyde are condensed, characterized in that precondensates of urea and formaldehyde containing monomethylolacrylamidomethyleneurea are added during the synthesis of the urea/formaldehyde resin.

4,977,238

ADDITIVES SUITABLE FOR USE IN AMINOPLASTIC RESINS

Roger Garrigue, and Jack Lalo, both of Toulouse, France, assignors to Norsolor S. A., Paris La Defense, France

Continuation-in-part of Ser. No. 345,267, May 1, 1989, abandoned. This application Nov. 29, 1989, Ser. No. 443,851

Claims priority, application France, Apr. 29, 1988, 88 05744

Int. Cl.[5] C08G *12/12, 14/08*

U.S. Cl. 528—230 **10 Claims**

1. An acrylic additive derived from urea, comprising precondensate of urea and formaldehyde containing monomethylolacrylamidomethyleneurea.

4,977,239

POLYBASE FROM AMINO AMIDO CARBOXYLIC ACID, POLYAMINE AND DIFUNCTIONAL ALKYLATING AGENT

Walter Kamutzki, Dieburg, and Karl-Heinz Keil, Hanau-Mittelbuchen, both of Fed. Rep. of Germany, assignors to Cassella Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Sep. 5, 1989, Ser. No. 402,519

Claims priority, application Fed. Rep. of Germany, Oct. 14, 1988, 3835014

Int. Cl.[5] C08G *69/26*

U.S. Cl. 528—310 **13 Claims**

1. A water-soluble organic polybase which is prepared by reacting a mixture of about 1 part by weight of one or more carboxylic compounds of formula (I)

$$R^2—CO—R^1—COOH \quad (I)$$

and about 0.5 to 1.5 parts by weight of one or more polyalkylene imines of formula (II)

$$H_2N—(CH_2)_s—\underset{\displaystyle T^1}{N}—(CH_2)_s—\underset{\displaystyle T^2}{N}—(CH_2)_s\rangle_t NH_2 \quad (II)$$

with about 0.01 to 5% by weight, based on the mixture of the compounds of formulae (I) and (II), of one or more difunctional alkylating agents,

wherein

R^1 is a single bond, or R' is alkylene having 1 to 10 carbon atoms, alkenylene having 2 to 10 carbon atoms or phenylene;

R^2 is a moiety of the formula (III)

$$H_2N—(CH_2)_u—NH—(CH_2)_u—NH)_w \quad (III)$$

or a moiety of the formula (IV)

$$H_2N—(CH_2)_v—\underset{\displaystyle T^3}{N}—(CH_2)_v—\underset{\displaystyle T^4}{N}—(CH_2)_v\rangle_x NH— \quad (IV)$$

wherein

T^1 and T^2 are hydrogen or $—(CH_2)_s—NH)_yH$;

T^3 and T^4 are hydrogen or $—(CH_2)_v—NH)_zH$;

s, u and v are each, independent of the other, the number 2, 3, 4 or 5;

w is the number 0, 1, 2 or 3; and

t, x, y and z are each, independent of the other, a number such that the compound of formula (II) or the moiety of formula (IV) has an average molecular weight of 2,000 to 30,000.

4,977,240

UNSATURATED ALKYD-CONTAINING ORGANIC PEROXIDE COMPOSITION

Akio Ishiwatari, Onoda, Japan, assignor to Kayaku Akzo Corporation, Tokyo, Japan

Filed Nov. 7, 1989, Ser. No. 433,051

Claims priority, application Japan, Nov. 11, 1988, 63-283711

Int. Cl.[5] C08F *8/00*

U.S. Cl. 528—493 **7 Claims**

1. A curing agent composition for the curing of unsaturated polyester resins which comprises from about 10% to about 80%, by weight of the composition, of an organic peroxide, and an unsaturated alkyd which is fluid at room temperature.

4,977,241

PARTICULATE POLYMER AND PREPARATION PROCESS THEREOF

Teruhiko Sugimori; Fumio Suzuki; Hideaki Habara, and Hiromasa Inada, all of Ohtake, Japan, assignors to Mitsubishi Rayon Company, Ltd., Tokyo, Japan

Continuation of Ser. No. 898,018, Aug. 19, 1986, Pat. No. 4,874,841. This application Dec. 24, 1987, Ser. No. 140,670

Claims priority, application Japan, Aug. 21, 1985, 60-181820; Aug. 30, 1985, 60-191399

Int. Cl.[5] C08J *3/16*

U.S. Cl. 528—497 **9 Claims**

1. A process for preparing a particulate polymer by the agglomeration of polymer particles contained in a polymer latex obtained by emulsion polymerization, said polymer being a 5–80 weight percent elastomer-containing copolymer, said particulate polymer being composed of primary particles and/or secondary particles, said primary particles being in the form of a compact mass substantially free of voids and having particles sizes of at least 20 μm, and said secondary particles being formed by the agglomeration of at least some of said primary particles, which comprises the steps of:

mixing the polymer latex and an organic liquid having low solubility in water, which is incapable of dissolving the polymer but being capable of wetting the polymer in amounts such that the volume proportion of organic liquid to polymer ranges from 0.124 to 0.759 followed by;

adding a coagulant to the resultant mixture in an amount sufficient to coagulate the polymer latex thereby forming said polymer particles;

stirring or shaking the resulting mixture; and

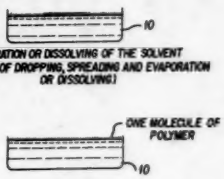
solidifying and densifying the polymer particles obtained by heating the polymer particles to a temperature above the glass transition point of the polymer.

4,977,242

ULTRA FINE POLYMER PARTICLE, COMPOSITE MATERIAL THEREOF AND METHODS OF PREPARATION THEREOF

Jiro Kumaki, Tokyo, Japan, assignor to Research Development Corp. of Japan, Japan

Division of Ser. No. 841,189, Mar. 19, 1986, Pat. No. 4,839,463.
This application Mar. 15, 1989, Ser. No. 323,821
Claims priority, application Japan, Apr. 1, 1985, 60-66556
Int. Cl.[5] C08F 6/00
U.S. Cl. 528—499 11 Claims


10
EVAPORATION OR DISSOLVING OF THE SOLVENT
(REPETITION OF DROPPING, SPREADING AND EVAPORATION OR DISSOLVING)
ONE MOLECULE OF POLYMER
10

1. A method for preparing a composite material comprising cumulatable ultra fine polymer particles each consisting of one molecular chain of the polymer cumulated on a substrate, which comprises the steps:

spreading a dilute solution of the polymer on the surface of a subphase which has a weak affinity for the polymer.

evaporating the spreading solvent or dissolving the solvent into the subphase, thereby producing the ultra fine polymer particles each consisting of one molecular chain of the polymer on the subphase, and

transferring the ultra fine polymer particles onto the substrate by bringing the substrate into contact with the ultra fine polymer particles formed on the subphase,

the dilute solution of the polymer having a concentration of not more than C* represented by the formula:

$$C^* = 3M/(4\pi N_A \langle S^2 \rangle^{3/2})$$

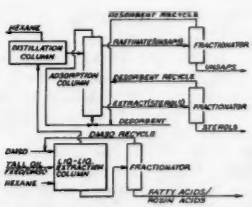
where C* is the concentration, M is the molecular weight of the polymer, π is the ratio of the circumference of a circle to its diameter, N_A is the Avogadro number, and S^2 is the square mean of the radius of gyration of the polymer chain.

4,977,243

SEPARATION OF STEROLS FROM LOW-ACID FEEDS WITH MAGNESIUM SILICATE AND METHYL-TERT-BUTYL ETHER DESORBENT

Timothy J. Barder, Addison; W. Brian Bedwell, Chicago, and Steven P. Johnson, Prospect Heights, all of Ill., assignors to UOP, Des Plaines, Ill.

Filed Dec. 28, 1988, Ser. No. 291,013
Int. Cl.[5] C09F 1/02; B01D 15/00
U.S. Cl. 530—208 15 Claims



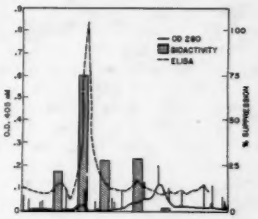
1. A process for separating sterols in high purity from a feed mixture containing said sterols which process comprises contacting at adsorption conditions said mixture with an adsorbent comprising a magnesium silicate molecular sieve, selectively adsorbing said sterols to the substantial exclusion of other components of said feed, and contacting the adsorbent containing said sterols with a desorbent material comprising methyl-t-butyl ether to desorb said sterols therefrom as a fluid extract stream.

4,977,244

UROMODULIN AND A PROCESS OF PURIFYING IT

Andrew V. Muchmore, Potomac, and Jean M. Decker, Rockville, both of Md., assignors to The United States of America as represented by the Department of Health and Human Services, Washington, D.C.

Continuation-in-part of Ser. No. 749,442, Jun. 27, 1985, abandoned. This application Dec. 19, 1986, Ser. No. 943,406
Int. Cl.[5] C07K 15/06, 3/28
U.S. Cl. 530—350 6 Claims



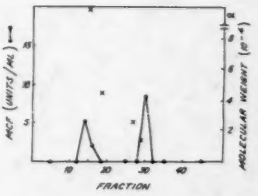
1. Substantially pure Uromodulin protein having the following characteristics: (a) a molecular weight of 85 kilodaltons, as determined by SDS-PAGE, (b) a carbohydrate content of approximately 30% w/w, (c) specifically binds to lectins, (d) specifically binds to interleukin-1 and (e) specifically binds to tumor necrosis factor.

4,977,245

METHODS AND COMPOSITIONS FOR INDUCING MONOCYTE CYTOTOXICITY

C. Michael Jones, Houston, Tex., assignor to Board of Regents, The University of Texas System, Austin, Tex.

Filed Oct. 10, 1986, Ser. No. 917,983
Int. Cl.[5] C07K 15/00; A61K 37/00
U.S. Cl. 530—35 7 Claims



1. A substantially purified human monocyte cytotoxicity inducing factor characterized by the following properties:

(a) capable of inducing human monocytes to a cytotoxic state;

(b) an apparent molecular weight of approximately 11.5 kilodaltons as determined by gel filtration chromatography;

(c) an apparent molecular weight of between about 18.1 and

about 14.7 kilodaltons as determined by SDS polyacrylamide gel electrophoresis;

(d) retention of biologic activity following treatment at pH 2 for one hour;

(e) retention of biologic activity following treatment at 60° C. for one hour;

(f) ability to bind to matrex gel red A under low salt conditions and elute from Matrex gel red A under high salt conditions; and

(g) retention of biologic activity in the presence of antiserum to interferon gamma, interferon alpha, or a combination of antisera to interferon alpha and gamma.

4,977,246

HIGH RECOVERY PROCESS FOR ANTIHEMOPHILIC FACTOR

Ted C. K. Lee, Lansdale, and Michael E. Hrinda, Gwynedd Valley, both of Pa., assignors to Rorer Pharmaceutical Corporation, Fort Washington, Pa.

Filed Jun. 6, 1989, Ser. No. 361,885

Int. Cl.[5] C07K *3/24, 3/28, 3/18*

U.S. Cl. 530—383 **6 Claims**

1. A method for obtaining an AHF-rich product from human plasma comprising the steps of:

(a) thawing freshly frozen human plasma at a temperature of 6° C. to 10° C. to obtain a plasma solution;

(b) adding one volume of about 1.20 M to 1.80 M aqueous solution of a precipitating agent selected from the group consisting of sodium citrate, potassium citrate and citric acid to two volumes of said plasma solution obtained in step (a) at a temperature of about 0° C. to 10° C. to form a precipitate;

(c) incubating the precipitate-containing solution in an ice bath for about 20 to 40 minutes; and

(d) separating the precipitate from the solution.

4,977,247

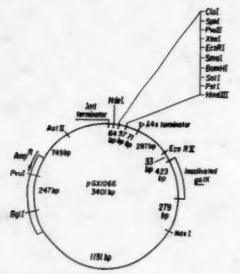
IMMOBILIZED PROTEIN G VARIANTS AND THE USE THEREOF

Stephen R. Fahnestock, Olney; Timothy Lee, Gaithersburg, both of Md., and Marie H. Wroble, Mt. Airy, all of Md., assignors to Genex Corporation, Gaithersburg, Md.

Continuation-in-part of Ser. No. 209,236, Jun. 20, 1988, which is a continuation-in-part of Ser. No. 63,959, Jun. 19, 1987, which is a continuation-in-part of Ser. No. 329, Feb. 17, 1987, which is a continuation-in-part of Ser. No. 854,887, Apr. 23, 1986, abandoned, which is a continuation-in-part of Ser. No. 829,354, Feb. 14, 1986, abandoned. This application May 19, 1989, Ser. No. 354,264

Int. Cl.[5] C07K *3/00*; C08H *1/00*; C12N *15/00*

U.S. Cl. 530—387 **16 Claims**



1. A cysteine-containing protein G variant having the following amino acid sequence:

```
          5                  10
 1 M D P Y P L P K T D
31 D A A T A E K V F K
61 F T V T E K P E V I
91 L K G E T T T K A V
121 V W T Y D D A T K T

                15                  20
          T Y K L I L N G K T
          Q Y A N D N G V D G
          D A S E L T P A V T
          D A E T A E K A F K
          F T V T E M V T E V

                                25                  30
          L K G E T T T E A V
          E W T Y D D A T K T
          T Y K L V I N G K T
          Q Y A N D N G V D G
          P R S C
```

immobilized to a solid phase support by linkage through the cysteine group.

4,977,248

PROCESS FOR THE PRODUCTION OF A PROTEIN

Thomas E. Creighton, Caxton Cottage, Swaffham Prior, Cambridge, England (CB5 0HT)

Continuation of Ser. No. 939,043, Dec. 1, 1986, abandoned. This application Aug. 10, 1989, Ser. No. 391,709

Claims priority, application United Kingdom, Mar. 29, 1985, 8508340

Int. Cl.[5] C07K *3/20*

U.S. Cl. 530—412 **12 Claims**

1. A process for the production of a protein in native form, in which a solution of the denatured protein is contacted with a solid phase and the denatured protein is reversibly bound to the solid phase, characterised in that the bound protein is renatured by progressively reducing with time the concentration of denaturing agent in the solvent in contact with the solid phase, and the renatured protein is recovered from the solid phase in native form.

4,977,249

METAL OF HYDROXY-PHENYLAZE AND HYDROXY-NAPHTHYLAZO COMPOUNDS AS NEAR-RED ABSORBERS

Yuto Matsumoto; Hiroyoshi Yamaga; Noboru Akuzawa, and Toshio Obara, all of Tokyo, Japan, assignors to Hodogaya Chemical Co., Ltd., Tokyo, Japan

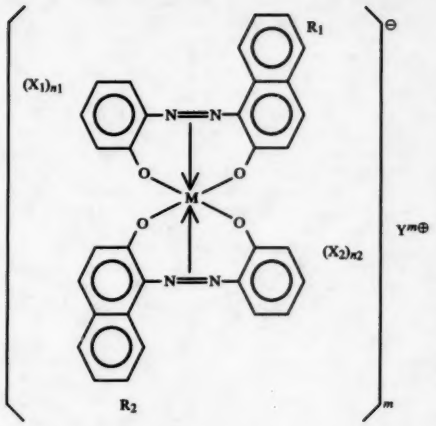
Continuation of Ser. No. 69,188, Jul. 2, 1987, abandoned. This application Dec. 13, 1989, Ser. No. 449,139

Claims priority, application Japan, Jul. 13, 1986, 61-178795

Int. Cl.[5] C09B *45/01, 45/14*; D06P *1/10*; G03G *9/08*

U.S. Cl. 534—696 **2 Claims**

1. A metal complex compound having the formula:



wherein each of X_1 and X_2, which are the same or different, is nitro, halogen, phenylazo or methoxy-substituted phenylazo, naphthylazo or methoxy-substituted naphthylazo; each of n_1 and n_2, which are the same or different, are each an integer of from 1 to 3, each of R_1 and R_2, which are the same or different, is amino, mono-lower alkylamino, di-lower alkylamino, acetylamino or benzoylamino; M is chromium, iron or cobalt; n is an integer of at least 2; and Y^{m+} is a metal ion selected from the group consisting of Ca^{+2} and Al^{+3}.

4,977,250

PROCESS FOR CONTROLLED DEPOLYMERIZATION OF POLYSACCHARIDES

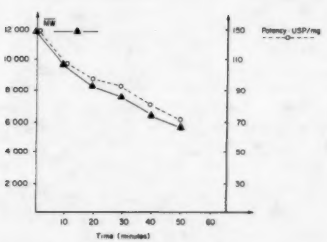
Víctor B. Díaz; Ricardo H. Dománico, both of Buenos Aires, Argentina, and Fernando Fussi, Lugano, Switzerland, assignors to Aorca S.A., Buenos Aires, Argentina

Filed Nov. 19, 1987, Ser. No. 122,466

Claims priority, application Argentina, Nov. 21, 1986, 305985

Int. Cl.[5] C08B *37/10*; C07H *1/00, 3/00*

U.S. Cl. 536—21 **11 Claims**



1. A process for depolymerization of linear polysaccharides, which comprises subjecting a polysaccharide to the action of atomic oxygen, thereby forming a depolymerized polysaccharide.

4,977,251

DNA PROBES FOR IDENTIFICATION OF BACTEROIDES SPECIES

Abigail A. Salyers, Champaign, Ill., and Alex P. Kuritza, Los Angeles, Calif., assignors to University of Illinois Board of Trustees, Urbana, Ill.

Continuation of Ser. No. 8,904, Jan. 30, 1987, abandoned. This application Aug. 23, 1988, Ser. No. 236,305

Int. Cl.[5] C07H *21/00*

U.S. Cl. 536—27 **5 Claims**

1. A composition of matter for detecting the presence of *Bacteroides fragilis* by hybridization to DNA from said organism comprising the DNA probe pBFII-4 in combination with an acceptable carrier.

2. A composition of matter for detecting the presence of the *Bacteroides fragilis* group of species by hybridization to DNA from said organisms comprising the DNA probe pBE-3 in combination with an acceptable carrier.

3. A composition of matter for detecting the presence of *Bacteroides* sp. strains and *Fusobacterium* sp. strains by hybridization to DNA from said organisms comprising the DNA probe pBO-21 in combination with an acceptable carrier.

4,977,252

MODIFIED STARCH EMULSIFIER CHARACTERIZED BY SHELF STABILITY

Chung-Wai Chiu, Westfield, N.J., assignor to National Starch and Chemical Investment Holding Corporation, Wilmington, Del.

Continuation-in-part of Ser. No. 167,051, Mar. 11, 1988, abandoned. This application Aug. 18, 1988, Ser. No. 234,070

Int. Cl.[5] C08B *31/02, 31/08, 31/16*

U.S. Cl. 536—102 **25 Claims**

1. A modified starch having emulsification properties whose emulsions are characterized by improved stability and resistance to oiling and gelling during storage, comprising a starch derivative containing a hydrophobic group or both a hydrophilic group and a hydrophobic group, of which up to 70%, by weight, has been degraded by an exo-enzyme capable of cleaving 1,4-alpha-D-glucosidic linkages from non-reducing ends of the starch but incapable of cleaving 1,6-alpha-D-glucosidic linkages of the starch.

4,977,253

PROCESS FOR THE SULFATION OF ALKYLOLIGOGLYCOSIDES

Norbert Ripke, Haltern, Fed. Rep. of Germany, assignor to Huels Aktiengesellschaft, Marl, Fed. Rep. of Germany

Filed Aug. 2, 1989, Ser. No. 388,499

Claims priority, application Fed. Rep. of Germany, Oct. 13, 1988, 3834911

Int. Cl.[5] C07H *1/00*; C07G *3/00*; C08B *37/00*

U.S. Cl. 536—118 **9 Claims**

1. A process for the sulfation of an alkyloligoglycoside having an alkyl group containing from 8 to 22 carbon atoms and having an average degree of oligomerization of 1 to 5, comprising:

Short contact time sulfating of said alkyloligoglycoside with a sulfating agent in an organic solvent having a boiling point of 30° to 100° C.

4,977,254

PROCESS FOR THE CHLORINATION OF SUGARS

Nigel J. Homer; Graham Jackson; George H. Sankey, all of Reading, and Philip J. Simpson, Tadley, all of Great Britain, assignors to Tate & Lyle PLC, United Kingdom

Filed Aug. 2, 1989, Ser. No. 388,657

Claims priority, application United Kingdom, Aug. 3, 1988, 8818430

Int. Cl.[5] C07H *1/00, 15/00*; C08B *37/00*; C07G *3/00*

U.S. Cl. 536—124 **14 Claims**

1. In the process for the chlorination of sucrose and partly

protected sucrose derivatives by reaction of unprotected hydroxyl groups with thionyl chloride to form a persulphite followed by decomposition of the sulphite groups to form chlorosulphites, displacement of the chlorosulphite groups and insertion of chlorine atoms at one or more positions, the improvement consisting in that formation and displacement of the chlorosulphite groups and insertion of chlorine atoms is effected by reaction with thionyl chloride in an inert solvent in the presence of a quaternary salt of the formula:

$$N^+R^1R^2R^3R^4\ Cl^- \qquad (I)$$

wherein R^1, R^2 and R^3, which may be the same or different, each represent a lower alkyl group, and R^4 represents an arylalkyl group with at least seven carbon atoms; and, when the sucrose or partly protected sucrose derivative has more than three unprotected hydroxyl groups, the process comprises the following stages:

(a) reaction of the sucrose or partly protected sucrose derivative with thionyl chloride in the presence of pyridine to form a persulphite;

(b) isolation of the polysulphite to remove free pyridine; and

(c) reaction of the isolated polysulphite with thionyl chloride in an inert solvent or suspension medium in the presence of a quaternary salt of the general formula (I).

4,977,255

STEROIDAL 17α-SILYL ETHERS AND PROCESS TO CORTICOIDS AND PROGESTERONES

Douglas A. Livingston; Bruce A. Pearlman, both of Kalamazoo, Mich., and Scott Denmark, Urbana, Ill., assignors to The Upjohn Company, Kalamzaoo, Mich.

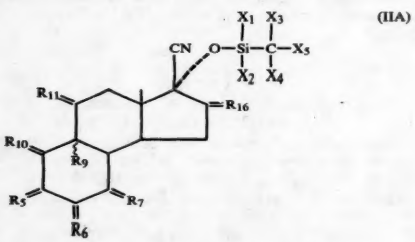
PCT No. PCT/US87/02818, § 371 Date Apr. 7, 1989, § 102(e) Date Apr. 7, 1989, PCT Pub. No. WO88/03534, PCT Pub. Date May 19, 1988

PCT Filed Nov. 5, 1987, Ser. No. 346,117

Int. Cl.[5] C07J 51/00, 41/00

U.S. Cl. 540—4 25 Claims

1. An α-halo silyl ether of formula IIA



(IIA)

and the C_{17} epimer thereof where:

(A-I) R_6 is $=CH_2$ or α—$R_{6\text{-}1}$:β—$R_{6\text{-}2}$, R_{10} is α—$R_{10\text{-}1}$:β—$R_{10\text{-}2}$ and R_7 is α—H:β—H, where one of $R_{6\text{-}1}$ and $R_{6\text{-}2}$ is —H, and the other is —H, —F, —Cl or C_1–C_3 alkyl, $R_{10\text{-}2}$ is $-CH_3$, $R_{10\text{-}1}$ and R_5 taken together are $-(CH_2)_2-C(=R_{3\text{-}3})-CH=$ or $-CH=CH-C(=R_{3\text{-}3})-CH=$, where $R_{3\text{-}3}$ is $=O$,

$=N-R_{3\text{-}8}$ where $R_{3\text{-}8}$ is C_1–C_5 alkyl, $-\phi$ or $-CH_2-\phi$,

$-X_{21}-CH_2CH_2-X_{22}-$ where X_{21} and X_{22} are the same or different and are —O— or —S—,

α—X_{21}–X_{23}:β—X_{22}–X_{24} where X_{23} and X_{24} the same or different and are C_1–C_5 alkyl or $-\phi$ and where X_{21} and X_{22} are as defined above, or

α—H:β—$OR_{3\text{-}4}$ or α—$OR_{3\text{-}4}$:β—H, where $R_{3\text{-}4}$ is —H,

$-CO-X_{25}$ where X_{25} is —H, C_1–C_7 alkyl or $-\phi$,

$-C-\phi_3$, $-CH_2-\phi$,

$-CO-CF_3$, $-CO-CCl_3$, $-CO-O-R_{3\text{-}8}$ where $R_{3\text{-}8}$ is as defined above,

$-SiX_{26}X_{27}X_{28}$ where X_{26}, X_{27} and X_{28} are the same or different and are C_1–C_5 alkyl or $-\phi$, or

$-Si(X_1)(X_2)-C(X_3)(X_4)(X_5)$ where

X_1 is —F, —Cl, —Br, $-CH_3$, $-\phi$ or $-OX_{1\text{-}1}$ where $X_{1\text{-}1}$ is C_1–C_5 alkyl or $-\phi$, X_2 is —F, —Cl, —Br, $-CH_3$, $-\phi$ or $-OX_{2\text{-}1}$ where $X_{2\text{-}1}$ is C_1–C_5 alkyl or $-\phi$, X_3 is —H, —Cl, —Br or —I, X_4 is —H and X_5 is —Cl, —Br or —I;

(A-II) R_5 is $R_{5\text{-}3}$:$R_{5\text{-}4}$, R_6 is $R_{6\text{-}3}$:$R_{6\text{-}4}$, R_{10} is α—$R_{10\text{-}3}$:β—$R_{10\text{-}4}$ and R_7 is α—H:β—H, where one of $R_{6\text{-}3}$ and $R_{6\text{-}4}$ is —H, —F, —Cl, C_1–C_3 alkyl, and the other taken together with one of $R_{5\text{-}3}$ and $R_{5\text{-}4}$ forms a second bond between C_5 and C_6, $R_{10\text{-}4}$ is $-CH_3$, $R_{10\text{-}3}$ and the other of $R_{5\text{-}3}$ and $R_{5\text{-}4}$ taken together is $-(CH_2)_2-C(=R_{3\text{-}3})-CH_2-$ where $R_{3\text{-}3}$ is as defined above;

(A-III) R_{10} and R_5 taken together are $=CH-CH=C(OR_{3\text{-}6})-CH=$ where $R_{3\text{-}6}$ is $R_{3\text{-}4}$, —H, C_1–C_5 alkyl, lithium, sodium, potassium, magnesium; R_6 is α—$R_{6\text{-}5}$:β—$R_{6\text{-}6}$ where one of $R_{6\text{-}5}$ and $R_{6\text{-}6}$ is —H, and the other is —H, —F, —Cl or C_1–C_3 alkyl and R_7 is α—H:β—H;

(A-IV) R_5 is α—$R_{5\text{-}7}$:β—$R_{5\text{-}8}$, R_6 is α—$R_{6\text{-}7}$:β—$R_{6\text{-}8}$, R_7 is α—H:β—H and R_{10} is α—$R_{10\text{-}7}$:β—$R_{10\text{-}8}$, where one of $R_{5\text{-}7}$ and $R_{5\text{-}8}$ is —H, $R_{10\text{-}7}$ and the other of $R_{5\text{-}7}$ and $R_{5\text{-}8}$ taken together are $-(CH_2)_2-C(=R_{3\text{-}3})-CH_2-$, where $R_{3\text{-}3}$ is as defined above, $R_{10\text{-}8}$ is $-CH_3$, where one of $R_{6\text{-}7}$ and $R_{6\text{-}8}$ is —H and the other is —H, —F, —Cl or C_1–C_3 alkyl;

(A-V) R_6 is $R_{6\text{-}9}$:$R_{6\text{-}10}$, R_7 is $R_{7\text{-}9}$:$R_{7\text{-}10}$, R_{10} is α—$R_{10\text{-}9}$:β—$R_{10\text{-}10}$, where one of $R_{6\text{-}9}$ and $R_{6\text{-}10}$ is —H, —F, —Cl, C_1–C_3 alkyl and the other taken together with one of $R_{7\text{-}9}$ and $R_{7\text{-}10}$ forms a second bond between C_6 and C_7, and the other of $R_{7\text{-}9}$ and $R_{7\text{-}10}$ is —H, $R_{10\text{-}10}$ is $-CH_3$, $R_{10\text{-}9}$ and R_5 taken together are $-(CH_2)_2-C(=R_{3\text{-}3})-CH=$ or $-CH=CH-C(=R_{3\text{-}3})-CH=$, where $R_{3\text{-}3}$ is as defined above;

(A-VI) R_6 is $=CH_2$ or α—$R_{6\text{-}11}$:β—$R_{6\text{-}12}$, R_{10} is α—$R_{10\text{-}11}$:β—$R_{10\text{-}12}$ and R_7 is α—H:β—H where one of $R_{6\text{-}11}$ and $R_{6\text{-}12}$ is —H, and the other is —H, —F, —Cl or C_1–C_5 alkyl, $R_{10\text{-}12}$ is $-CH_3$, $R_{10\text{-}11}$ and R_5 taken together are $-CH_2-CH=C(R_{3\text{-}9})-CH=$, where $R_{3\text{-}9}$ is

$-NX_{29}X_{30}$ where X_{29} and X_{30} are the same or different and are C_1–C_5 alkyl, $-\phi$, $-CH_2-\phi$ and where X_{29} and X_{30} are taken together with the attached nitrogen atom to form a heterocyclic ring selected from the group consisting of pyrrolidine, piperidine and morpholine or

$-OR_{3\text{-}6}$ where $R_{3\text{-}6}$ is as defined above, and

$-CH(\alpha-OR_1)-CH=C(OR_{3\text{-}6})-CH=$ where $R_{3\text{-}6}$ is as defined above;

(A-VII) R_5 is $R_{5\text{-}13}$:$R_{5\text{-}14}$, R_6 is $R_{6\text{-}13}$:$R_{6\text{-}14}$, R_7 is α—H:β—H, R_{10} is α—$R_{10\text{-}13}$:β—$R_{10\text{-}14}$ where one of $R_{6\text{-}13}$ and $R_{6\text{-}14}$ is —H, —F, —Cl or C_1–C_3 alkyl and the other taken together with one of $R_{5\text{-}13}$ and $R_{5\text{-}14}$ forms a second bond between C_5 and C_6, $R_{10\text{-}14}$ is $-CH_3$, $R_{10\text{-}13}$ taken together with the other of $R_{5\text{-}13}$ and $R_{5\text{-}14}$ are $-CH=CH-C(R_{3\text{-}3})-CH_2-$ where $R_{3\text{-}3}$ is as defined above;

(A-VIII) R_5 is $R_{5\text{-}15}$:$R_{5\text{-}16}$, R_6 is $R_{6\text{-}15}$:$R_{6\text{-}16}$, R_{10} is α—$R_{10\text{-}15}$:β—CH_3 and R_7 is α—H:β—H, where one of $R_{6\text{-}15}$ and $R_{6\text{-}16}$ is —H, —F, —Cl and C_1–C_3 alkyl and the other taken together with one of $R_{5\text{-}15}$ and $R_{5\text{-}16}$ forms a second bond between C_5 and C_6, $R_{10\text{-}15}$ and the other of $R_{5\text{-}15}$ and $R_{5\text{-}16}$ taken together are $-CH=CH-C(R_{3\text{-}9})=CH-$ where $R_{3\text{-}9}$ is as defined above;

(A-IX) R_5 is $R_{5\text{-}17}$:$R_{5\text{-}18}$, R_6 is $R_{6\text{-}17}$:$R_{6\text{-}18}$, R_{10} is α—$R_{10\text{-}17}$:β—$R_{10\text{-}18}$ and R_7 is α—H:β—H, where one of $R_{6\text{-}17}$ and $R_{6\text{-}18}$ is —H, —F, —Cl, and C_1–C_3 alkyl, and the other taken together with one of $R_{5\text{-}17}$ and $R_{5\text{-}18}$ forms a second bond between C_5 and C_6, $R_{10\text{-}17}$ and the other of $R_{5\text{-}17}$ and $R_{5\text{-}18}$ taken together are $-CH_2-CH_2-C(R_{3\text{-}9})=CH-$, where $R_{3\text{-}9}$ is as defined above and where $R_{10\text{-}18}$ is $-CH_3$;

(A-X) R_5 is α—$R_{5\text{-}19}$:β—$R_{5\text{-}20}$, R_7 is α—H:β—H and R_{10} is α—$R_{10\text{-}19}$:β—CH_3 where $R_{5\text{-}20}$ and $R_{10\text{-}19}$ taken together are $-CH_2-CH_2-CHZ-CH_2-$, where Z and $R_{5\text{-}19}$

taken together are a carbon-carbon single bond, R_6 is α—H:β—$OR_{6\text{-}20}$ where $R_{6\text{-}20}$ is C_1–C_5 alkyl;

(C-I) R_{11} is $R_{11\text{-}1}$:$R_{11\text{-}2}$, where one of $R_{11\text{-}1}$ and $R_{11\text{-}2}$ is taken together with R_9 to form a second bond between C_9 and C_{11} and the other of $R_{11\text{-}1}$ and $R_{11\text{-}2}$is —H;

(C-II) R_{11} is α—H:β—O—, where β—O— is taken together with R_9 to form an epoxide between C_9 and C_{11} in the β-configuration;

(C-III) α—R_9 is —H, —Br, —Cl or —F and R_{11} is =O or α—$R_{11\text{-}5}\beta$—$R_{11\text{-}6}$, where one of $R_{11\text{-}5}$ and $R_{11\text{-}6}$ is —H, and the other of $R_{11\text{-}5}$ and $R_{11\text{-}6}$ is —H, or —$OR_{3\text{-}4}$ where is as defined above;

(C-IV) α—R_9 is —$OR_{9\text{-}1}$ where $R_{9\text{-}1}$ is —H, —$SiX_{26}X_{27}X_{28}$ where X_{26}, X_{27} and X_{28} are as defined above, —CO—ϕ, —CO—$R_{9\text{-}2}$ where $R_{9\text{-}2}$ is —H, C_1–C_5 alkyl, —$OR_{9\text{-}3}$ where $R_{9\text{-}3}$ is C_1–C_5 alkyl or —CH_2—ϕ, and R_{11} is α—H:β—H;

R_{16} is =CH_2 or α—$R_{16\text{-}1}$:β—$R_{16\text{-}2}$, where $R_{16\text{-}1}$ is —H, —F, —CH_3 or —$OR_{3\text{-}4}$ where $R_{3\text{-}4}$ is as defined above, $R_{16\text{-}2}$ is —H, —F and —CH_3 with the proviso that one of $R_{16\text{-}1}$ and $R_{16\text{-}2}$ is —H;

X_1 is —F, —Cl, —Br, —CH_3, —ϕ or —$OX_{1\text{-}1}$ where $X_{1\text{-}1}$ is C_1–C_5 alkyl or —ϕ;

X_2 is —F, —Cl, —Br, —CH_3, —ϕ or —$OX_{2\text{-}1}$ where $X_{2\text{-}1}$ is C_1–C_5 alkyl or —ϕ;

X_3 is —H, —Cl, —Br or —I,

X_4 is —H and

X_5 is —Cl, —Br or —I.

4,977,256

METHOD OF ELIMINATING PROTECTIVE GROUPS

Sakae Aoyagi; Takaaki Hayashi, both of Shiki, and Yasuhiro Kuramoto, Niiza, all of Japan, assignors to Lederle (Japan), Ltd., Tokyo, Japan

Continuation-in-part of Ser. No. 129,560, Dec. 7, 1987, abandoned. This application Jun. 10, 1988, Ser. No. 205,294

Int. Cl.[5] C07D *487/04, 501/04*

U.S. Cl. 540—227 **13 Claims**

1. A method deprotection which comprises contacting a β-lactam compound having at least one of an amino or carboxyl group protected by a p-nitrobenzyloxycarbonyl group or a p-nitrobenzyl respectively group with zinc powder in a buffer selected from the group consisting of a phosphate buffer, an acetate buffer, a citrate buffer, an N-methylmorphorine buffer, and a morpholinopropanesulfonate buffer having a pH in the range of from 5 to 7 whereby splitting off said protective p-nitrobenzyloxycarbonyl or p-nitrobenzyl group.

4,977,257

DMF SOLVATES OF A BETA-LACTAM ANTIBIOTIC

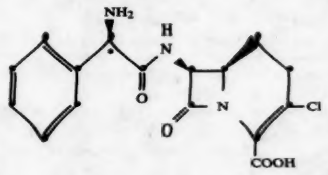
Thomas M. Eckrich, and Richard C. Hoying, both of Indianapolis, Ind., assignors to Eli Lilly and Company, Indianapolis, Ind.

Continuation of Ser. No. 271,545, Nov. 14, 1988, abandoned. This application May 29, 1990, Ser. No. 530,140

Int. Cl.[5] C07D *487/04*

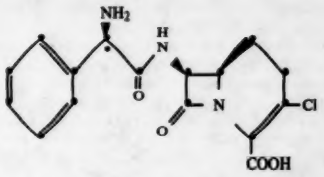
U.S. Cl. 540—205 **6 Claims**

1. A crystalline bis (N,N'-dimethylformamide) solvate form of the compound of the Formula I



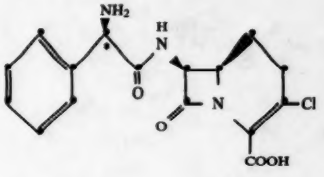
I

3. A crystalline dihydrate mono N,N'-dimethylformamide) solvate form of the compound of the Formula I:



I

5. A crystalline mono(N,N'-dimethylformamide) solvate form of the compound of Formula I:



I

4,977,258

BENZOXAZEPINONE PROCESS

Peter G. Houghton, Bassingbourn, Nr. Royston, and Stanley H. B. Wright, Sawbridgeworth, both of England, assignors to Merck, Sharp & Dohme Ltd., Hertfordshire, England

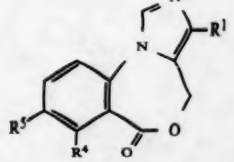
Filed Sep. 29, 1989, Ser. No. 414,222

Claims priority, application United Kingdom, Oct. 6, 1988, 8823475

Int. Cl.[5] C07D *498/04*

U.S. Cl. 540—548 **8 Claims**

1. A compound of Formula [III]:



(III)

wherein R^1 is an aromatic heterocyclic group containing 5 or 6 atoms, up to 3 of which are selected from the group consisting of oxygen, nitrogen and sulfur, any of which groups may be unsubstituted or substituted on a carbon atom by a substituent selected from the group consisting of $C_{1\text{-}5}$ alkyl, $C_{3\text{-}6}$ cycloalkyl, trifluoromethyl, phenyl, amino, $C_{1\text{-}6}$ alkylamino, $C_{1\text{-}6}$ alkoxy ($C_{1\text{-}6}$) alkyl and hydroxy and R^4 and R^5 are independently selected from the group consisting of hydrogen, halogen, trifluoromethyl, cyano, nitro, amino and lower alkyl.

4,977,259

PROCESS FOR PREPARING REACTIVE STABILIZING COMPOUND

Alberto Greco, Dresano; Carlo Busetto, S. Donato Milanese; Luigi Cassar, S. Donato Milanese, and Carlo Neri, S. Donato Milanese, all of Italy, assignors to Enichem Sintesi S.p.A., Palermo, Italy

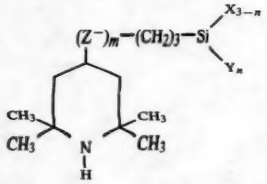
Division of Ser. No. 733,526, May 13, 1985, Pat. No. 4,684,726. This application May 14, 1987, Ser. No. 50,312

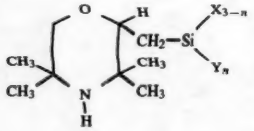
Claims priority, application Italy, May 21, 1984, 21023 A/84

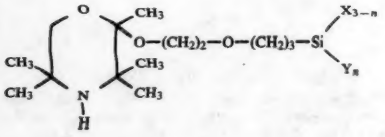
Int. Cl.[5] C07F 7/10, 7/12, 7/18

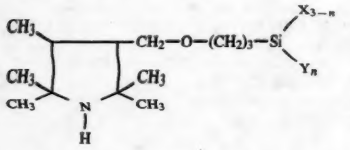
U.S. Cl. 544—69 13 Claims

1. A process for preparing reactive stabilizing compounds having one of the following formulas:





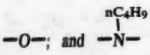




wherein;

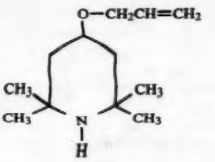
m is 1;

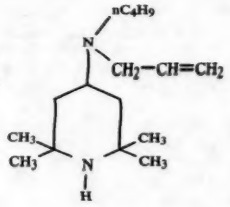
Z is selected from

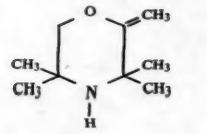


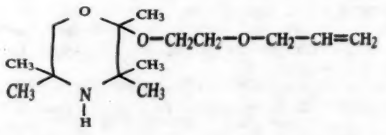
X is selected from a linear or branched alkyl group having from 1 to 5 carbon atoms;

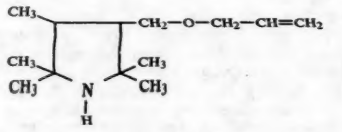
Y is selected from hydrogen, halogen, C_1-C_4 acyloxy, C_1-C_4 alkyoxy, amino, aminooxy or silyloxy; and n is an integer selected from one, two or three comprising, reacting a compound of the formula:











with a silylating agent selected from compounds of the formula

wherein X and Y have the same meaning as above.

4,977,260

INTERMEDIATES FOR PREPARING MONO-, BI-AND TRICYCLIC AMINO ACIDS

Rainer Henning, Hattersheim am Main, and Hansjörg Urbach, Kronberg/Taunus, both of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

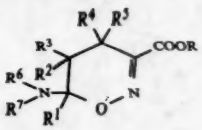
Division of Ser. No. 122,380, Nov. 19, 1987, Pat. No. 4,849,524. This application Apr. 10, 1989, Ser. No. 335,443

Claims priority, application Fed. Rep. of Germany, Nov. 21, 1986, 3639879

Int. Cl.[5] C07D 413/04, 265/02

U.S. Cl. 544—73 5 Claims

1. A compound of the formula II



II

in which

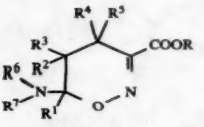
R is hydrogen, $(C_1–C_6)$-alkyl or $(C_7–C_9)$-aralkyl,

R^1 to R^5 are identical or different and independently of one another denote hydrogen, $(C_1–C_8)$-alkyl, $(C_3–C_9)$-cycloalkyl, $(C_3–C_9)$-cycloalkyl-$(C_1–C_4)$-alkyl, $(C_5–C_9)$-cycloalkenyl-$(C_1–C_4)$-alkyl, $(C_6–C_{12})$-aryl-$(C_1–C_4)$-alkyl or $(C_6–C_{12})$-aryl, where the two last-mentioned substitutents can each be mono-, di- or trisubstituted in the aryl moiety by $(C_1–C_4)$-alkyl, $(C_1–C_4)$-alkoxy, hydroxyl, halogen, nitro, methylenedioxy and/or cyano, or in which the pairs of radicals R^1 and R^2, R^2 and R^3, and R^4 and R^5 together with the carbon atom or two carbon atoms supporting them form a 4- to 10-membered saturated or unsaturated mono- or bicyclic carbocyclic ring system and the other radicals are hydrogen, and

R^6 and R^7 denote $(C_1–C_6)$-alkyl or $(C_7–C_9)$-aralkyl or R^6 and R^7 together with the nitrogen atom supporting them form a 5- to 10-membered heterocycle which can additionally contain an oxygen atom,

with the proviso that simultaneously R does not stand for ethyl, R^3 to R^5 do not stand for hydrogen, R^6 and R^7 together with the nitrogen atom supporting them do not stand for a morpholine ring and (i) R^2 does not stand for methyl or ethyl in the case where R^1 is hydrogen, ethyl or phenyl and (ii) R^1 and R^2, together with the two carbon atoms supporting them, do not form a cyclopentane, cyclohexane or cycloheptane ring.

5. A compound of the formula II



II

in which

R is hydrogen, $(C_1–C_6)$-alkyl or $(C_7–C_9)$-aralkyl,

R^1 to R^5 are identical or different and independently of one another denote hydrogen, $(C_1–C_8)$-alkyl $(C_3–C_9)$-cycloalkyl, $(C_3–C_9)$-cycloalkyl-$(C_1–C_4)$-alkyl, $(C_5–C_9)$-cycloalkenyl-$(C_1–C_4)$-alkyl, $(C_6–C_{12})$-aryl-$(C_1–C_4)$-alkyl or $(C_6–C_{12})$-aryl, where the two last-mentioned substituents can be mono-, di- or trisubstituted in the aryl moiety by $(C_1–C_4)$-alkyl, $(C_1–C_4)$-alkoxy, hydroxyl, halogen, nitro, methylenedioxy or cyano, or in which the pairs of radicals R^1 and R^2, R^2 and R^3, and R^4 and R^5 together with the carbon atom or two carbon atoms supporting them form a 4- to 10-membered saturated or unsautrated mono- or bicyclic carboxylic ring system and the other radicals are hydrogen, and

R^6 and R^7 denote $(C_1–C_6)$-alkyl or $(C_7–C_9)$-aralkyl or R^6 and R^7 together with the nitrogen atom supporting them form a 5- to 10-membered heterocycle which can additionally contain an oxygen atom,

with the proviso that simultaneously R does not stand for ethyl, R^3 to R^5 do not stand for hydrogen, R^6 and R^7 together with the nitrogen atom supporting them do not stand for a morpholine ring and (i) R^2 does not stand for methyl in case where R^1 is ethyl and (ii) R^1 and R^2, together with the two carbon atoms supporting them, do not form a cyclohexane ring.

4,977,261

ANTHRAQUINONE COMPOUND

Yutaka Kayane, Ibaraki; Takashi Omura, Ashiya; Naoki Harada, Suita; Yasuji Mori; Yosuke Yamamoto, both of Takarazuka; Tetsuya Miyamoto, Takatsuki, and Takehiro Kusumoto, Ibaraki, all of Japan, assignors to Sumitomo Chemical Company, Ltd., Osaka, Japan

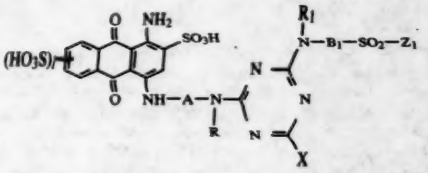
Filed Jan. 11, 1988, Ser. No. 141,762

Claims priority, application Japan, Jan. 14, 1987, 62-6314; Feb. 16, 1987, 62-32783; Nov. 30, 1987, 62-304303; Nov. 30, 1987, 62-304304

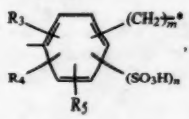
Int. Cl.[5] C07D 251/70

U.S. Cl. 544—199 14 Claims

1. An anthraquinone compound of the following formula in the free acid form,

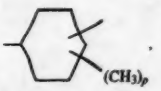


wherein R and R_1 independently of one another are each hydrogen or alkyl, A is divalent group of the following formula (a), (b), (c), (d), (e), or (f), the formula (a) being

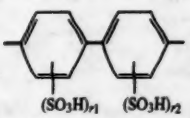


in which R_3, R_4 and R_5 independently of one another are each hydrogen, methyl, ethyl, methoxy or ethoxy, m is 0 or 1, n is 0, 1 or 2, and the asterisked linkage bonds to

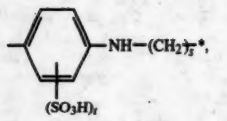
the formula (b) being



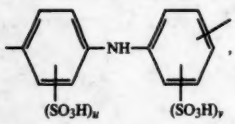
in which p is 0, 1, 2 or 3, the formula (c) having $-CH_2)_q$ in which q is an interger of from 2 through 6, the formula (d) being



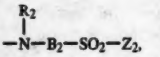
in which r_1 and r_2 are each 0, 1 or 2, and $r_1+r_2=1$ or 2, the formula (e) being



in which s is an integer of from 2 through 6, t is 0, 1 or 2, and * is as defined above, and the formula (f) being

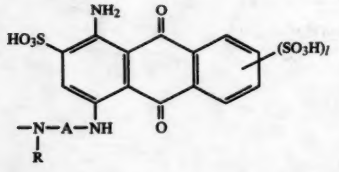


in which u and v independently of one another are each 0, 1 or 2, B_1 is phenylene unsubstituted or substituted once or twice by methyl, ethyl, methoxy, ethoxy, chloro, bromo or nitro, or naphthylene unsubstituted or substituted by sulfo, Z_1 is vinyl or $-CH_2CH_2L$ in which L is a group capable of being split by the action of an alkali, l is 0, 1 or 2, and X is a group of the following formula (g), (h) or (i), the formula (g) being



in which R_2 is hydrogen or alkyl, B_2 is phenylene unsubstituted or substituted once or twice by methyl, ethyl, methoxy, ethoxy, chloro, bromo, nitro, carboxy or sulfo, or naphthylene unsubstituted or substituted by sulfo, and Z_2 is vinyl or $-CH_2CH_2L$ in which L is as defined above, the formula

in which R_6 and R_7 independently of one another are each hydrogen, alkyl, phenyl, naphthyl or benzyl, and the formula (i) being



in which R, A and l are as defined above.

4,977,262

TRISUBSTITUTED SYMMETRICAL TRIAZINES

Andrei Herzlinger, Karmiel; Leonard M. Shorr, Haifa; Salomone Antebi, Haifa; Theodor Morel-Fisher, Haifa; Lev Utevskii, Beer-Sheva, and Yaakov Scheinert, Omer, all of Israel, assignors to Bromine Compounds Limited, Israel

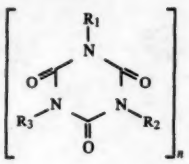
Filed Aug. 25, 1988, Ser. No. 236,557

Claims priority, application Israel, Aug. 28, 1987, 83679

Int. Cl.[5] C07D *251/12, 251/30;* **B05D** *3/02;* **C09D** *5/16*

U.S. Cl. 544—221 **5 Claims**

1. A triazine derivative of the formula:



wherein R_1, R_2 and R_3 are independently selected from the group consisting of ring perhalogenated benzyls and ring perhalogenated xylylidenes, and n is an integer between 1 and 5.

4,977,263

PROCESS FOR PREPARING 1,8-BRIDGED 4-QUINOLONE-3-CARBOXYLIC ACID ANTIBACTERIALS

Michael Schriewer, Odenthal; Klaus Croche, Glanthal; Hans-Jonchim Zeiler, Valbert, and Karl G. Hetzner, Wuppertal, all of Fed. Rep. of Germany, assignors to Bayer Aktiengesellschaft, Leverkusen, Fed. Rep. of Germany

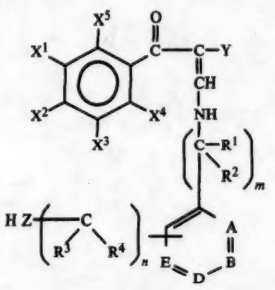
Division of Ser. No. 272,619, Nov. 17, 1988, Pat. No. 4,902,795, which is a division of Ser. No. 108,839, Oct. 15, 1987, Pat. No. 4,841,059. This application Sep. 25, 1989, Ser. No. 412,975

Claims priority, application Fed. Rep. of Germany, Jan. 15, 1986, 3600891

Int. Cl.[5] C07D *237/00, 239/02, 241/00, 241/02*

U.S. Cl. 544—329 **1 Claim**

1. A process for the preparation of an enamine of the formula



in which

X^1 represents hydrogen, nitro, alkyl with 1–3 carbon atoms or halogen,

X^2 denotes halogen, alkyl with 1–3 carbon atoms, an alkyklsulphonyl group with up to 3 C atoms in the alkyl radical or a phenylsulphonyl group,

R^5 can be hydrogen, halogen or methyl,

R^1, R^2, R^3 and R^4 each independently represents hydrogen, an alkyl group with 1–3 carbon atoms, phenyl, or a phenyl radical which is substituted by halogen, nitro, or alkyl with up to 3 carbon atoms,

at least two of A, B, D and E representing nitrogen and the balance representing C—H,

Y represents a carboxyl group, a nitrile group an ester group $-COOR^5$ or an acid amide group $-CONR^6R^7$,

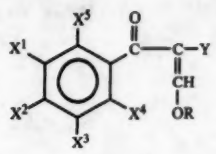
Z represents oxygen or an amine radical NR^8,

m and n each denote 0 or 1,

X^3 represents halogen or the nitro group and

X^4 denotes halogen, a nitro group, an alkoxy, alkylmercapto or alkylsulphonyl group with in each case 1–3 carbon atoms or an arylsulphonyl group,

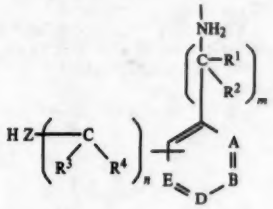
which comprises reacting an enol ether of the formula



in which

R represents CH_3, C_2H_5 or n-C_3H_7,

with a primary amine of tho formula



4,977,264

PROCESS FOR THE PRODUCTION OF 4,5-DICHLORO-6-ETHYLPYRIMIDINE

Lester Mills, Naters, and Felix Previdoli, Brig, both of Switzerland, assignors to Lonza Ltd., Gampel/Valais, Switzerland

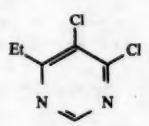
Filed Nov. 8, 1989, Ser. No. 433,134

Claims priority, application Switzerland, Nov. 21, 1988, 4306/88

Int. Cl.[5] C07D *239/30*

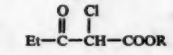
U.S. Cl. 544—334 6 Claims

1. Process for the production of 4,5-dichloro-6-ethylpyrimidine:



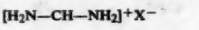
(1)

characterized in that a 2-chloro-3-oxopentanoic acid ester of the formula



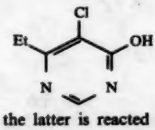
(2)

in which R is an alkyl group with 1 to 4 C atoms, is condensed with a formamidinium salt:



(3)

and X− *is the anion of a strong inorganic acid or a lower aliphatic carboxylic acid, in the presence of a base in a polar, protic solvent into* 5-chloro-6-ethyl-4-hydroxypyrimidine:



(4)

and the latter is reacted with phosphoryl chloride into the product (1).

4,977,265

QUINOLINE DERIVATIVES

Synèse Jolidon, Therwil; Rita Locher, Basel; Ivan Kompis, Oberwil, all of Switzerland; Ekkehard Weiss, Inzlingen, Fed. Rep. of Germany, and Pierre-Charles Wyss, Muttenz, Switzerland, assignors to Hoffmann-La Roche Inc., Nutley, N.J.

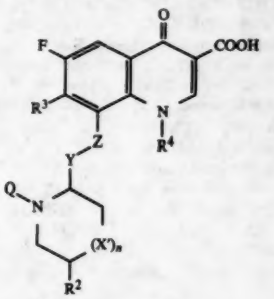
Division of Ser. No. 274,162, Nov. 21, 1988, Pat. No. 4,946,847, which is a division of Ser. No. 910,566, Sep. 22, 1986, Pat. No. 4,806,541. This application May 15, 1990, Ser. No. 524,196

Claims priority, application Switzerland, Sep. 24, 1985, 4120/85; Aug. 7, 1986, 3677/86

Int. Cl.[5] C07D *401/12*

U.S. Cl. 544—363 6 Claims

1. A compound of the formula



II

wherein

X' is a group N—R or N—Q', Q and Q' are hydrogen or a nitrogen protecting group, R^3 is halogen,

n is the integer 1 or 0,

R is hydrogen, C_{1-4}-alkyl, C_{2-4}-alkylene—$N(R^a,R^b)$ or optionally ring-substituted benzyl,

Y is methylene or ethylene,

Z is methylene, O or S,

R^2 is hydrogen, C_{1-4}-alkyl or, when n is O, it can also be OH or $N(R^e,R^f)$,

R^4 is hydrogen, C_{3-6}-cycloalkyl, $N(R^c,R^d)$, optionally substituted phenyl or optionally fluorinated C_{1-4}-alkyl or C_{2-4}-alkenyl, and

R^a to R^g are hydrogen or C_{1-4}-alkyl, or $N(R^a,R^b)$ is a 5- or 6-membered saturated ring optionally containing an additional heteroatom O or N—R^g.

4,977,266

AMINOETHYLETHANOLAMINE AND ETHYLENEDIAMINE PRODUCERS COMPOSITION AND METHOD FOR PRODUCING SAME

Lloyd M. Burgess, South Charleston, W. Va., and Charles A. Gibson, Centreville, Va., assignors to Union Carbide Chemicals And Plastics Company Inc., Danbury, Conn.

Filed Sep. 30, 1987, Ser. No. 102,928

The portion of the term of this patent subsequent to Nov. 27, 2007, has been disclaimed.

Int. Cl.[5] C07C *209/00*

U.S. Cl. 544—398 4 Claims

1. A process of manufacturing the alkyleneamines producers composition comprising, based on 100% of the moles of the composition,

(a) about 15 to about 50 mole % of AEEA,

(b) about 15 to about 55 mole % EDA,

(c) about 10 to about 20 mole % DETA,

(d) about 5 to about 20 mole % of the combination of PIP, AEP and HEP,

(e) about 3 to about 10 mole % of one or more of TETAs and TEPAs,

(f) less than about 1 mole % of other polyalkylene polyamines,

(g) an DETA to AEEA mole ratio less than 0.77, and

(h) an EDA to AEEA mole ratio less than 8.

which comprises feeding hydrogen, ammonia and MEA to a reaction zone containing a fixed bed of a reductive amination catalyst, wherein the hydrogen comprises about 20 to about 60 mole percent of the feed in the reaction zone and the mole ratio of ammonia to MEA is about 1 to about 5, the temperature of the reaction zone is about 120° C. to about 300° C., the pressure of the reaction zone is about 400 to about 1200 psig., the conversion of MEA is about 20 to about 45 weight percent, and recovering said procedures composition from the reaction zone.

4,977,267

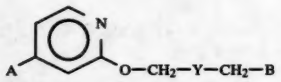
INTERMEDIATES FOR PYRIDYLOXY COMPOUNDS HAVING UTILITY AS ANTI-PEPTIC ULCER AGENTS

Nobuhiko Hirakawa, Kokubunji; Noriaki Kashiwaba, Kawasaki; Hajime Matsumoto, Hino; Akihiko Hosoda, Shiki; Yasuo Sekine, Yokohama; Yoshikazu Isowa, Tokyo; Tetsuaki Yamura, Niiza; Akihiro Sekine, Kyoto, and Masashi Nishikawa, Higashikurume, all of Japan, assignors to Fujirebio Kabushiki Kaisha, Tokyo, Japan

Division of Ser. No. 166,022, Mar. 9, 1988, Pat. No. 4,912,101.
This application Jan. 26, 1989, Ser. No. 301,856
Claims priority, application Japan, Mar. 13, 1987, 62-56434; Nov. 17, 1987, 62-288331; Nov. 17, 1987, 62-288332
Int. Cl.[5] C07D *401/12, 403/14, 405/12;* C07F *7/02*
U.S. Cl. 546—272 20 Claims

1. A compound represented by the following formula

(VI)



wherein A represents a formyl group, a formyl group protected by a lower alcohol, a lower alkylene group or a lower alkylester of orthoformic acid, a hydroxymethyl group, or a hydroxymethyl group in which the hydroxyl group is protected by a protective group which can be split off by hydrolysis and which is selected from the group consisting of tetrahydropyranyl group, lower alkoxyalkyl group, aralkyl group and silyl group, B represents a halogen atom, an amino group, a phthalimide group, a hydroxyl group or a hydroxyl group protected by a protective group which can be split off by hydrolysis and which is selected from the group consisting of tetrahydropyranyl group, lower alkoxyalkyl group, aralkyl group and silyl group, and Y represents $-CH_2-CH_2-$ or $-CH=CH-$.

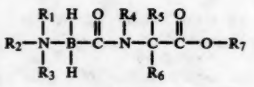
4,977,268

BORON DIPEPTIDE COMPOUNDS

Andrew T. McPhail, Durham; Bernard F. Spielvogel, Raleigh, and Iris H. Hall, Chapel Hill, all of N.C., assignors to Duke University, Durham, N.C.

Filed Apr. 8, 1988, Ser. No. 179,555
Int. Cl.[5] C07C *103/52, 5/02*
U.S. Cl. 548—110 8 Claims

1. A boron dipeptide analog corresponding to the general formula:



wherein R_1, R_2, R_3, R_4, R_5 and R_7 can be the same or different and are H or C_1–C_{18} alkyl and wherein R_6 is H or C_1–C_{18} alkyl, C_1–C_{18} thioalkyl, C_1–C_{18} alkanol, C_1–C_{18} alkylphenol, C_1–C_{18} arylalkyl, C_1–C_{18} alkylamine, C_1–C_{18} alkylamide, C_1–C_{18} alkylcarboxylic acid, C_1–C_{18} alkylguanidino, C_1–C_{18} alkylindole or C_1–C_{18} alkylimidazole and further wherein R_4 can be bonded to R_6 so as to form a pyrrolidino ring.

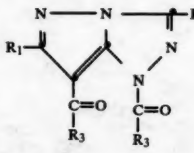
4,977,269

DIACYLATION OF PYRAZOLORTRIAZOLES

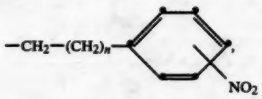
Robert W. Arnold, Webster, and Cataldo A. Maggiulli, Pittsford, both of N.Y., assignors to Eastman Kodak Company, Rochester, N.Y.

Division of Ser. No. 313,561, Feb. 22, 1989, Pat. No. 4,914,209.
This application Nov. 30, 1989, Ser. No. 443,283
Int. Cl.[5] C07D *487/02*
U.S. Cl. 548—262.4 8 Claims

1. Process for the preparation of a pyrazolotriazole having the formula:

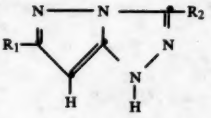


wherein R_1 is hydrogen or a hydrocarbyl group having up to about 20 carbon atoms, R_2 is a group having the formula:



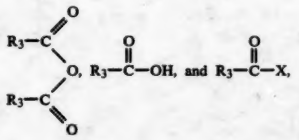
wherein n is a small whole number having a value of 0 to 6, and R_3 is an alkyl or aryl group having up to about 20 carbon atoms;

said process comprising reacting (A) a compound having the formula:



wherein R_1 and R_2 have the same significance as above, with at least about two moles of (B) an acylating reagent,

said acylating reagent comprising an acylating agent selected from:



wherein X is a halogen, and R_3 has the same significance as above, and a catalytic quantity of a Lewis acid or Bronsted acid conducted in the substantial absence of water.

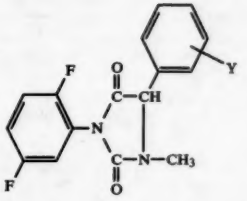
4,977,270

SUBSTITUTED 2,4-DIOXODIAZOLIDINES AND -THIADIAZOLIDINES AND THEIR USE AS HERBICIDES

Siok-Hui H. Wee, Berkeley, Calif., assignor to ICI Americas Inc., Wilmington, Del.

Filed Dec. 1, 1988, Ser. No. 278,708
Int. Cl.[5] C07D *233/02*; A01N *43/50*
U.S. Cl. 548—314 18 Claims

1. A compound having the formula



in which Y is a member selected from the group consisting of H, 2-F, 4-F, 3-Cl, 4-Cl, 2,4-di-Cl, 3,4-di-Cl, 2-Br, 3-Br, 4-Br, 4-I, 4-CH_3, 4-t-C_4H_9, 3-OCH_3, 4-OC_2H_5 and 3-OC_6H_5.

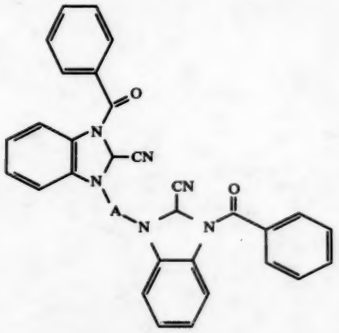
4,977,271

REISSERT COMPOUND OF BISBENZIMIDAZOLE

Harry W. Gibson, and Yajanarayana H. R. Jois, both of Blacksburg, Va., assignors to Virginia Tech Intellectual Properties Inc., Blacksburg, Va.

Filed Oct. 6, 1989, Ser. No. 418,319
Int. Cl.[5] C07D *403/06*
U.S. Cl. 548—328 1 Claim

1. A Reissert compound of bisbenzimidazole having the formula



where A is C(O)RC(O) with R being alkylene.

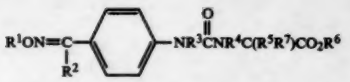
4,977,272

OLEFINIC N,N'-DISUBSTITUTED UREAS

Mark C. Cesa, South Euclid; James E. Rinz, University Heights; Gilles Klopman, East Cleveland, and Teodora T. Kopp, Garfield Heights, all of Ohio, assignors to The Standard Oil Company, Cleveland, Ohio

Division of Ser. No. 197,711, May 23, 1988. This application Jun. 29, 1989, Ser. No. 372,996
Int. Cl.[5] C07D *403/00, 233/54, 209/10*; C07C *229/00*
U.S. Cl. 548—336 1 Claim

1. A compound of the formula,



where each of R^1, R^2, R^3, R^4, R^5, R^6 and R^7 has zero to 10 C atoms, and no acetylenic unsaturation; each of R^1, R^2, R^3 and R^4 is independently selected from H and hydrocarbyl; with the proviso that R^6 is C_1–C_{10} hydrocarbyl; each of R^5 and R^7 is independently selected from H, hydrocarbyl and hydrocarbyl substituted with a group selected from:

hydrocarbylcarbonylamino, di(hydrocarbylcarbonyl)amino, N-hydrocarbylcarbonyl(N-hydrocarbyl)amino, formylamino, diformylamino, and formyl(N-hydrocarbyl-)amino, hydrocarbyloxy, hydrocarbylthio, formyl, formylthio, hydrocarbylcarbonyloxy, hydrocarbylcarbonylthio, hydrocarbylcarboxyl, hydrocarbylthiocarboxyl, hydrocarbylamino, dihydrocarbylamino, hydrocarbylcarbonyl, 3-indolyl, 3-(1-hydrocarbyl)indolyl, 3-(1-hydrocarbylcarbonyl)indolyl, 3-(1-formyl)indolyl, carbamoyl, hydrocarbylcarbamoyl, dihydrocarbylcarbamoyl, 5-imidazolyl, 5-(3-hydrocarbylcarbonyl)imidazolyl, and 5-(3-formyl)imidazoly; and where at least one of R^1, R^2, R^3, R^4, R^5, R^6 and R^7 contains olefinic unsaturation.

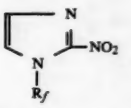
4,977,273

FLUORINE-CONTAINING 2-NITROIMIDAZOLE DERIVATIVES

Tsutomu Kagiya; Mitsuyuki Abe, both of Kyoto; Seiichi Nishimoto, Nara; Yuta Shibamoto, Kyoto; Susumu Otomo, Kounosu; Tohru Tanami, Tokyo; Kazuhiro Shimokawa, Settsu; Toru Yoshizawa, Osaka, and Yorisato Hisanaga, Ibaraki, all of Japan, assignors to Kyoto University of Honmachi, Kyoto; Taisho Pharmaceutical Co., Ltd., Tokyo and Daikin Industries, Ltd., Osaka, all of, Japan

Filed Dec. 12, 1989, Ser. No. 448,909
Claims priority, application Japan, Dec. 14, 1988, 63-315974
Int. Cl.[5] C07D *233/91*
U.S. Cl. 548—339 1 Claim

1. A 2-nitroimidazol derivative of the formula:

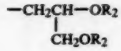


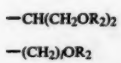
(I)

wherein R_f is a group of the following formula (II) or (III):

$$-CH_2CFXCH_2OR_1 \quad \text{(II)}$$

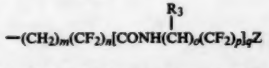
wherein X is a hydrogen atom or a halogen atom; R_1 is a group of the formula:





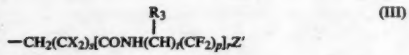
$-(CH_2)_iOR_2$

$-(CH_2)_iCOR_2$ or



wherein R_2 is a hydrogen atom, a hydroxyl group, a C_1–C_3 alkyl group, a C_2–C_4 acyl group, benzylidene or acetonide; R_3 is a hydrogen atom or a C_1–C_3 alkyl group; Z is a hydrogen atom, COOY, $COOR_3$, CONHOY, $CONR_4R_5$ (wherein R_4

and R_5 are hydroxyl group-containing C_1–C_3 alkyl groups or hydrogen atoms; Y is a hydrogen atom or a monovalent metal atom), an amino group, a hydroxyl group or OR_3; is an integer of 1 to 3; o is an integer of 0 to 3; p is an integer of 0 to 2; q is an integer of 0 to 3; m and n are integers of 0 to 4; and $1 \leqq m+n \leqq 4$ or



(III)

wherein R_3, X and p are the same as defined above; Z' is the same as Z or is $OCOOCH_3$; r is an integer of 1 to 3; s is 0 or 1; t is an integer of 0 to 4 provided that when $p=0$, $s \neq 0$ and at least one X is a fluorine atom.

4,977,274

4-HYDROXYINDOLE DERIVATIVES, THE PROCESS FOR PREPARATION THEREOF AND THEIR USE

Marcel Descamps, Wavre, and Walter Verstraeten, Mechelen, both of Belgium, assignors to Sanofi, Paris, France

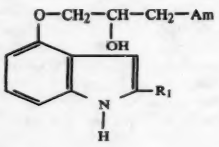
Continuation of Ser. No. 923,217, Oct. 27, 1986, abandoned. This application Aug. 28, 1989, Ser. No. 398,922

Claims priority, application France, Nov. 12, 1986, 85 16676

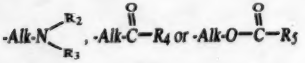
Int. Cl.[5] C07D 403/12

U.S. Cl. 548—455 **8 Claims**

2. A process for preparing a 4-(3-amino-2-hydroxypropoxy)indole having a formula:



in which R_1 can represent a hydrogen atom, a straight, or branched-chain alkyl group having from 1 to 6 carbon atoms, a cycloalkyl group having from 3 to 6 carbon atoms, a lower alkoxy group, a lower hydroxyalkyl group, a lower (lower alkoxy)alkyl group, a phenyl group optionally substituted with a halogen atom or with a lower alkyl or lower alkoxy group, a cyano group, or a radical of formula:



in which:

R_2 and R_3, which may be identical or different, each represent hydrogen or a lower alkyl group;

R_4 represents a hydroxy group, a lower alkyl or lower alkoxy group or

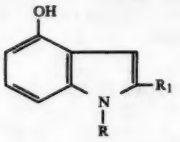
a

in which R_2 and R_3 have the same meaning as above,

R_5 represents a lower alkyl group; and

Alk represents a single bond or a straight- or branched-chain alkylene group having from 1 to 4 carbon atoms;

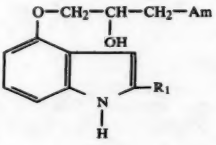
and wherein Am represents a substituted or unsubstituted amino group or a salt thereof, wherein a N-protected indole derivative of formula:



in which R and R_1 have the above meanings, is reacted under reflux and in an appropriate medium, with epichlorohydrin or epibromohydrin in the presence of a metalating agent and a tris (dioxaalkyl) amine as phase transfer catalyst to obtain a 4-hydroxyindole derivative, in crude form; the crude 4-hydroxyindole derivative so obtained is treated with an amine of general formula:

H—Am

in which Am has the same meaning as above, in a lower alcohol or an excess of the above amine, so as to form a 4-(2-hydroxypropoxy)indole derivative of general formula:



in which R and R_1 have the same meaning as above and Am has the same meaning as above; the 4-(2-hydroxypropoxy)indole derivative so obtained is deprotected by heating under reflux in a lower alcohol and in the presence of an alkali metal hydroxide to obtain the desired 4-(3-amino-2-hydroxypropoxy) indole derivative, which is optionally further reacted with an acid to form a salt thereof.

4,977,275

PYRROLE DERIVATIVES

Hiroshi Hasegawa, Narita; Kinichi Mogi, Abiko; Noriaki Shioiri, Narita; Susumu Sato, Shisui, and Tatsuhiko Katori, Tone, all of Japan, assignors to SS Pharmaceutical Co., Ltd., Tokyo, Japan

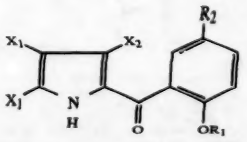
Filed Apr. 5, 1989, Ser. No. 333,239

Claims priority, application Japan, Apr. 5, 1988, 63-84328

Int. Cl.[5] C07D 207/30

U.S. Cl. 548—539 **1 Claim**

1. A pyrrole derivative represented by the following formula (I):



(I)

wherein X_1 and X_2 are the same or different and mean individually a halogen atom, R_1 denotes C_5 or C_6 cycloalkyl, halo-lower alkyl, lower alkenyl, lower-alkyl-substituted or unsubstituted phenyl, lower-alkoxyl substituted or unsubstituted benzyl group or a group —COR_3 in which R_3 is an alkyl group having at least five carbon atoms or a cyclo-C_{3-6} alkyl, halo-lower alkyl, lower alkenyl, lower-alkyl- or lower-alkoxyl-substituted or unsubstituted phenyl, or lower-alkoxyl substituted

or unsubstituted phenyl-lower alkyl, and R_2 stands for a hydrogen or halogen atom or a lower alkyl group.

4,977,276

HETEROAROTINOIDS AS ANTICANCER AGENTS

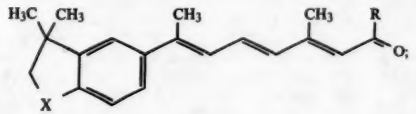
Kenneth D. Berlin; Warren T. Ford; Shirish N. Rajadhyaksha; Jonathan B. Gale, and Lyle W. Spruce, all of Stillwater, Okla., assignors to The Board of Regents for the Oklahoma Agricultural and Mechanical Colleges acting for and on behalf of Oklahoma State Univ., Stillwater, Okla.

Continuation-in-part of Ser. No. 267,935, Nov. 7, 1988, abandoned, which is a division of Ser. No. 48,586, May 11, 1987, Pat. No. 4,833,254. This application Dec. 28, 1989, Ser. No. 458,132

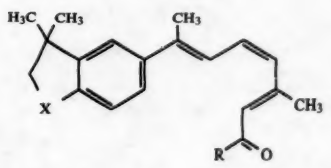
Int. Cl.[5] C07D *333/54, 307/79*

U.S. Cl. 549—58 9 Claims

1. A heteroarotinoid characterized by the formulae:



or



where X is S or O; and R is —H, —OH, —OCH_3 or —OC_2H_5.

4,977,278

PREPARATION OF RHODAMINE DYES IN GRANULE FORM BY DIRECT COOLING

Karl Schmeidl, Gefrees, Fed. Rep. of Germany, assignor to BASF Aktiengesellschaft, Ludwigshafen, Fed. Rep. of Germany

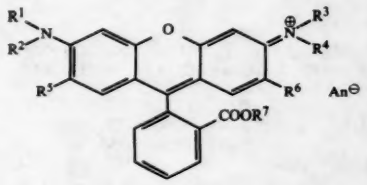
Filed Sep. 8, 1989, Ser. No. 404,754

Claims priority, application Fed. Rep. of Germany, Sep. 27, 1988, 3832739

Int. Cl.[5] C07D *311/82*

U.S. Cl. 549—227 4 Claims

1. A process for preparing a rhodamine dye of the formula I



(I)

where

R^1, R^3 and R^7 are identical or different and each is independently of the others methyl or ethyl,

R^2 and R^4 are identical or different and each is independently of the other hydrogen, methyl or ethyl,

R^5 and R^6 are identical or different and each is independently of the other hydrogen or methyl and

$An^{\oplus}$ is chloride, methosulfate or ethosulfate,

in granule form by precipitating a rhodamine dye of the formula I where R^1, R^2, R^3, R^4, R^5, R^6 and R^7 are each as defined above and $An^{\oplus}$ is an anion with sodium chloride from an aqueous medium which contains a water-miscible solvent, which comprises adding the sodium chloride at 80°–100° C., which precipitates the dye from the aqueous medium in a liquid state, then stirring the liquid dye to convert it into a droplet form and then chilling the droplets by direct cooling to below 65° C.

4,977,277

FUNCTIONALIZED PEPTIDYL AMINODIOLS AND -TRIOLS

4-AMINO-5-CYCLOHEXYL-3-HYDROXY-1,2-OXOPENTANE AND DERIVATIVES THEREOF

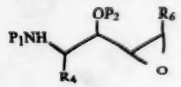
Saul H. Rosenberg; Jay R. Luly, and Jacob J. Plattner, all of Libertyville, Ill., assignors to Abbott Laboratories, Abbott Park, Ill.

Division of Ser. No. 191,714, May 9, 1988, Pat. No.

Int. Cl.[5] C07F *7/10*; C07D *303/36*

U.S. Cl. 549—215 6 Claims

1. A compound of the formula:



wherein P_1 is hydrogen or an N-protecting group; P_2 is hydrogen or an O-protecting group; R_4 is loweralkyl, C_4 to C_7 cycloalkylmethyl or benzyl; and R_6 is hydrogen or loweralkyl.

4,977,279

PROCESS FOR THE PREPARATION OF OPTICALLY ACTIVE 3-DEMETHYLMEVALONIC ACID DERIVATIVES, AND INTERMEDIATES

Günther Wess, Erlensee; Kurt Kesseler, Bad Soden am Taunus; Ekkehard Baader, Königstein/Taunus, and Gerhard Beck, Frankfurt am Main, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

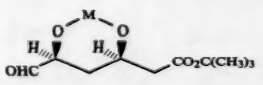
Division of Ser. No. 280,762, Dec. 6, 1988. This application Nov. 20, 1989, Ser. No. 438,305

Claims priority, application Fed. Rep. of Germany, Dec. 8, 1987, 3741509

Int. Cl.[5] C07D *319/06, 405/06, 239/26*

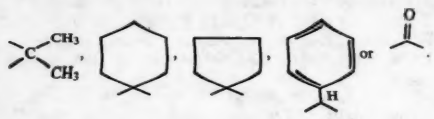
U.S. Cl. 549—274 1 Claim

1. An aldehyde of the formula XII



XII

in which M denotes a radical of the formula



4,977,280

CONJUGATES IN WHICH A MONOVALENT CARBOXYLIC IONOPHORE IS ASSOCIATED BY MEANS OF A COVALENT BOND WITH A MACROMOLECULE, THEIR USE AS IMMUNOTOXIN POTENTIATORS AND THE INTERMEDIATE ACTIVATED IONOPHORES

Franz Jansen, Castries, and Pierre Gros, Montpellier, both of France, assignors to Sanofi, Paris, France

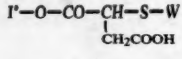
Division of Ser. No. 34,712, Apr. 6, 1987, Pat. No. 4,919,928, which is a continuation of Ser. No. 733,660, May 13, 1985, abandoned. This application Dec. 27, 1989, Ser. No. 457,858

Claims priority, application France, May 23, 1984, 84 08073; Jul. 13, 1984, 84 11208

Int. Cl.[5] C07D *493/10*

U.S. Cl. 549—343 3 Claims

1. An activated carboxylic ionophore corresponding to the formula:



in which I° represents the residue of an ionophore from which one of the hydroxyls has been removed, and W represents hydrogen or an acetyl group.

4,977,281

POLYOXYALKYLENE AMINO ALCOHOLS AND POLYOXYALKYLENE AMINO 1,3-DIOXANES AND 1,3-DIOXOLANES

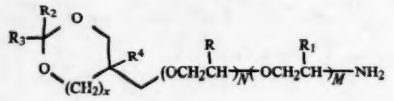
John W. Miley, Campobello, and John W. Rekers, Spartanburg, both of S.C., assignors to Milliken Research Corporation, Spartanburg, S.C.

Filed Dec. 21, 1987, Ser. No. 135,421

Int. Cl.[5] C07D *335/00, 319/04;* C07C *93/04, 93/08*

U.S. Cl. 549—373 1 Claim

1. A primary amino polyoxyalkylene 1,3-dioxane or 1,3-dioxolane compound of the formula:



wherein R and R_1 are independently selected form hydrogen or lower alkyl, R_2 and R_3 are independently selected from hydrogen, phenyl or lower alkyl; R_4 is selected from hydrogen or lower alkyl; X is 0 or 1; N and M are each integers of from 1 to about 100 and the sum of N and M is from 3 to about 100.

4,977,282

PRODUCTION OF D-ALPHA-TOCOPHEROL FROM NATURAL PLANT SOURCES

William S. Baldwin; Stephen M. Willging, and Brock M. Siegel, all of Minneapolis, Minn., assignors to Henkel Corporation, Ambler, Pa.

Division of Ser. No. 601,194, Apr. 17, 1984, abandoned. This application Apr. 13, 1989, Ser. No. 337,599

Int. Cl.[5] C07D *311/72*

U.S. Cl. 549—412 17 Claims

1. A process for separating d-alpha tocopherol from a mixture of d-alpha tocopherol and the aminomethyl adduct of non-alpha tocopherol homologues comprising:

contacting said mixture with a water immiscible non-polar solvent and a water miscible polar solvent and an acid whereby two phases are formed wherein the polar solvent phase contains the acid salts of the aminomethylated non-alpha tocopherols and said non-polar phase contains the d-alpha tocopherol and separating said phases into an alpha-tocopherol fraction and a non-alpha tocopherol amine adduct fraction.

4,977,283

PROCESS FOR THE OXIDATION OF 5-HYDROXYMETHYLFURFURAL

Ernst I. Leupold, Neu-Anspach; Matthias Wiesner, Mainz; Merten Schlingmann, Königstein, and Knut Rapp, Offstein, all of Fed. Rep. of Germany, assignors to Hoechst Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Jul. 27, 1989, Ser. No. 387,086

Claims priority, application Fed. Rep. of Germany, Jul. 30, 1988, 3826073

Int. Cl.[5] C07D *307/48, 307/68*

U.S. Cl. 549—484 23 Claims

1. A process for the oxidation of 5-hydroxymethylfurfural which comprises oxidizing 5-hydroxymethylfurfural in an aqueous medium at a pH value of at most 8 with oxygen in the presence of a catalyst which contains at least one metal of the platinum group.

4,977,284

PROCESS FOR PRODUCING 1,4-BUTANEDIOL AND TETRAHYDROFURAN

Sadakatsu Suzuki; Hiroyuki Inagaki, and Hiroshi Ueno, all of Saitama, Japan, assignors to Tonen Corporation, Tokyo, Japan

Filed Dec. 13, 1989, Ser. No. 450,104

Claims priority, application Japan, Dec. 14, 1988, 63-313760

Int. Cl.[5] C07D *307/08;* C07C *27/06*

U.S. Cl. 549—508 5 Claims

1. A process of producing 1,4-butadienol and tetrahydrofuran comprising:

hydrogenating a compound selected from group consisting of maleic acid anhydride, succinic acid anhydride, and mixtures thereof in a gas phase and in the presence of a catalyst comprising copper, chromium, and manganese.

4,977,285

RECOVERY OF TERTIARY BUTYL HYDROPEROXIDE AND TERTIARY BUTYL ALCOHOL

Edward T. Marquis, Austin; Kenneth P. Keating, Austin; Robert A. Meyer, Austin, and John R. Sanderson, Leander, all of Tex., assignors to Texaco Chemical Company, White Plains, N.Y.

Filed Dec. 8, 1989, Ser. No. 447,934

Int. Cl.[5] C07D *301/32, 308/19*

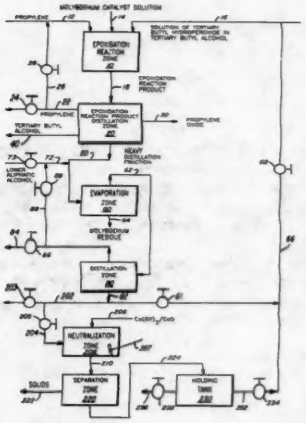
U.S. Cl. 549—529 7 Claims

1. In a process for the preparation of propylene oxide and tertiary butyl alcohol wherein propylene and tertiary butyl hydroperoxide are reacted in an epoxidation reaction zone in solution in tertiary butyl alcohol in the presence of a soluble molybdenum catalyst to provide an epoxidation reaction prod-

uct comprising unreacted propylene, unreacted tertiary butyl hydroperoxide, tertiary butyl alcohol, dissolved molybdenum catalyst and impurities, including lower aliphatic C_1–C_4 carboxylic acids, and wherein the epoxidation reaction product is resolved into product fractions in a distillation zone including a distillate propylene fraction, a distillate propylene oxide fraction, a distillate tertiary butyl alcohol fraction and a heavy liquid distillation fraction composed primarily of tertiary butyl hydroperoxide, tertiary butyl alcohol, the dissolved molybdenum catalyst, and impurities including lower aliphatic C_1–C_4 carboxylic acids, the improvement which comprises:

adding to said heavy liquid distillation fraction from about 5 to about 10 wt. %, based on the weight of said heavy liquid distillation fraction, of a lower aliphatic alcohol containing about 1 to about 3 carbon atoms to provide a mixture,

charging said mixture to a falling film evaporator and resolving said mixture therein under evaporator operating conditions including a temperature of about 20° to about 150° C. and a pressure of about 1 to about 200 mm Hg. into an



evaporated overhead fraction comprising about 80 to about 95 wt. % of the charged heavy liquid distillation fraction and a liquid residue fraction,

said evaporated overhead fraction containing substantially all of the said lower aliphatic alcohol initially charged to said falling film evaporator and also containing from about 60 wt. % to about 90 wt. % of tertiary butyl alcohol, about 1 wt. % to about 20 wt. % of tertiary butyl hydroperoxide and, correspondingly, about 3 wt. % to about 15 wt. % of impurities, including a portion of said lower aliphatic C_1–C_4 carboxylic acid impurities,

said liquid residue fraction comprising tertiary butyl hydroperoxide, tertiary butyl alcohol and impurities, including substantially all of the molybdenum contained in said heavy liquid fraction,

and separating said lower aliphatic alcohol from the other components of said evaporated overhead fraction and recycling said separated lower aliphatic alcohol to said falling film evaporator as at least a portion of the lower aliphatic alcohol comprising said mixture.

4,977,286

GLYCOLIPIDS

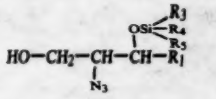
Kyriacos C. Nicolaou, Havertown, and Thomas J. Caulfield, Philadelphia, both of Pa., assignors to Trustees of the University of Pennsylvania, Philadelphia, Pa.

Filed Sep. 9, 1988, Ser. No. 242,723

Int. Cl.[5] C07C 117/00; C07F 7/18, 117/06

U.S. Cl. 552—4 8 Claims

1. A compound having the formula:



wherein R_1 is alkenyl having from about 4 to about 28 carbon atoms, and R_3, R_4, and R_5 are the same or different and are hydrocarbyl having from about 1 to about 7 carbon atoms.

4,977,287

ORGANOGERMANIUM COMPOUNDS AND PROCESS FOR PRODUCING THE SAME

Norihiro Kakimoto, Machida; Kunie Nakamura, Sagamihara, and Toru Yoshihara, Tama, all of Japan, assignors to Asai Germanium Research Institute Co., Tokyo, Japan

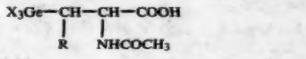
Filed Aug. 29, 1989, Ser. No. 400,062

Claims priority, application Japan, Aug. 29, 1988, 63-213899

Int. Cl.[5] C07F 7/30

U.S. Cl. 556—83 13 Claims

1. An organogermanium compound represented by the general formula (1)



(1)

wherein X is a halogen atom and R is a hydrogen atom, a lower alkyl group or a phenyl group.

4,977,288

M-AMINOPHENYLTRIALKYLSTANNANE

Amin I. Kassis, Chestnut Hill, and Leslie A. Khawli, Newton Centre, both of Mass., assignors to President and Fellows of Harvard College, Cambridge, Mass.

Filed Jan. 29, 1988, Ser. No. 150,131

Int. Cl.[5] C07F 7/22

U.S. Cl. 556—87 1 Claim

1. m-Aminophenyltribuytlstannane.

4,977,289

CATALYST FOR PRODUCING FLUOROSILICONE POLYMERS

Edwin R. Evans, Clifton Park, N.Y., assignor to General Electric Company, Waterford, N.Y.

Division of Ser. No. 125,304, Nov. 25, 1987, Pat. No. 4,897,459.

This application Nov. 16, 1989, Ser. No. 438,811

Int. Cl.[5] C07F 7/08

U.S. Cl. 556—454 24 Claims

1. Sodium fluorosilanolate liquid catalyst consisting essentially of molecules having the formula:

(1)

wherein W is 0 to 50; X is from 3 to 50; A is —OH, a C_{1-8}

alpha-beta alkenyl, C_{1-8} alkyl, C_{1-8} aryl, C_{1-8} halosubstituted alkyl, C_{1-8} alkoxy, or $-O^-Na$; R is a substituted or unsubstituted C_{1-8} hydrocarbon radical; and R^F is a C_{1-8} fluorine substituted alkyl.

4,977,290

POLAR APROTIC CATALYSTS FOR FORMATION OF FLUOROSILICONE FLUIDS

Edwin R. Evans, and Paul Maitoza, both of Clifton Park, N.Y., assignors to General Electric Company, Waterford, N.Y.

Filed Nov. 20, 1989, Ser. No. 439,968
Int. Cl.[5] C07F 7/08
U.S. Cl. 556—459 6 Claims

1. A process for producing low molecular weight silanol end-stopped diorganopolysiloxanes containing an average of 3 to 10 diorganosiloxy units and averaging 6 diorganosiloxy units comprising contacting a cyclic trimer of the formula:

$$[(R_2SiO)_3]\ (R^2RSiO)_3$$

where R^2 is a halogenated monovalent hydrocarbon radical and R is selected from the class consisting of monovalent hydrocarbon radicals and halogenated monovalent hydrocarbon radicals with a mixture comprising an aprotic solvent and water and separating the desired product after the hydrolysis.

4,977,291

PROCESS OF PRODUCING A SILANIC OR SILOXANIC COMPOUND CONTAINING AT LEAST ONE CYCLOALKYL RING

Francesco Gementi, Monza; Loris Sogli, Novara, and Raffaele Ungarelli, Trecate, all of Italy, assignors to Istituto Guido Donegani S.p.A., Novara, Italy

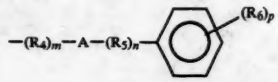
Continuation of Ser. No. 203,717, Jun. 2, 1988, abandoned. This application Sep. 15, 1989, Ser. No. 408,400
Claims priority, application Italy, Jun. 5, 1987, 41006 A/87
Int. Cl.[5] C07F 7/08, 7/10, 7/18
U.S. Cl. 556—466 13 Claims

1. A process of producing a silanic or siloxanic compound containing at least one cycloalkyl ring by the catalytic hydrogenation of a corresponding silanic or siloxanic compound containing at least one aromatic or heteroaromatic ring having the formula (I):

(I)

wherein:

X is an aryl, alkylaryl or arylalkyl group having from 6 to 20 carbon atoms, optionally containing, in the chain or in the ring, at least one heteroatom selected from oxygen, sulphur and nitrogen and, optionally, at least one halogen atom in place of a hydrogen atom; or the radical



wherein

R_4 and R_5, which may be same or different, are an alkylene radical containing from 1 to 20 carbon atoms,

R_6 is an alkyl, alkoxyl, hydroxyalkyl, carboxyalkyl, carboxyl or ester radical containing from 1 to 20 carbon atoms,

A is a heteroatom of the kind set forth above, and

m, n, and p are zero or an integer ranging from 1 to 10;

R_1, R_2 and R_3, which may be same or different, may have the same meaning as X, or may be a hydrogen atom, an alkyl, alkylene or alkoxy radical containing from 1 to 20 carbon atoms, a linear or branched alkyl radical having from 1 to 20 carbon atoms and containing one or more alkoxyl, carbonyl or carboxyl groups of an $N(R_7)_2$ group, in which R_7 is hydrogen atom or an alkyl radical containing from 1 to 20 carbon atoms, characterized in that the hydrogenation is carried out in solution, at a pressure of at least 2 bar and in the presence of a catalytic amount of Raney nickel catalyst having a granulometric distribution comprised essentially between 10 and 150 micrometers and a surface area of at least 80 m^2/g.

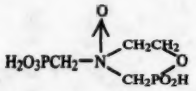
4,977,292

4-PHOSPHONOMETHYL-2-HYDROXY-2-OXO-1,4,2-OXAZAPHOSPHORINANE N-OXIDE AND WATER-SOLUBLE SALTS THEREOF

Chih M. Hwa, Palatine; John A. Kelly, Crystal Lake, and Mita Adhya, Barrington, all of Ill., assignors to W. R. Grace & Co.-Conn., New York, N.Y.

Filed Dec. 15, 1989, Ser. No. 451,402
Int. Cl.[5] C07F 9/40
U.S. Cl. 558—81 2 Claims

1. A compound of the formula



and water soluble salts thereof.

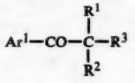
4,977,293

MONOETHYLENICALLY UNSATURATED COMPOUNDS

Kevin B. Hatton, Cambridge; Edward Irving, Burwell; Josephine M. A. Walshe, Girton, and Anne Mallaband, Bishops Stortford, all of England, assignors to Ciba-Geigy Corporation, Ardsley, N.Y.

Continuation of Ser. No. 224,624, Jul. 27, 1988, abandoned. This application Jan. 16, 1990, Ser. No. 465,513
Claims priority, application United Kingdom, Aug. 5, 1987, 8718496; May 25, 1988, 8812386
Int. Cl.[5] C07F 9/40
U.S. Cl. 558—153 11 Claims

1. A monoethylenically unsaturated compound of formula

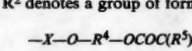


I

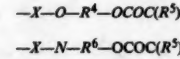
where

R^1 denotes an alkyl or alkoxy group of 1 to 10 carbon atoms

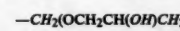
R^2 denotes a group of formula II, III or IIIA:



II

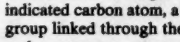


III



IIIA

R^3 denotes a monovalent aromatic group of 6 to 20 carbon atoms, linked through an aromatic carbon atom to the indicated carbon atom, a hydroxyl group, a tertiary amine group linked through the amino nitrogen to the indicated carbon atom, or a group of formula VI or VIA:



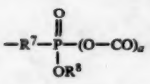
VI

R^4 denotes an alkylene group of 1 to 4 carbon atoms, which is unsubstituted or substituted by a hydroxyl group or by an acyloxy group of 2 to 20 carbon atoms.

R^5 denotes a hydrogen atom or an alkyl group of 1 to 4 carbon atoms,

R^6 denotes an alkylene group of 1 to 4 carbon atoms,

X denotes a group of formula IV or V



V

R^7 an alkylene group of 1 to 4 carbon atoms,

R^8 denotes an alkyl group of 1 to 4 carbon atoms,

a denotes zero or 1, and

Ar^1 denotes a monovalent aromatic group of 6 to 20 carbon atoms linked through an aromatic carbon atom to the indicated carbonyl group,

with the provisos that

(i) R^2, R^3 or Ar^1 contains a group of the formula

$$-OCOC(R^5)=CH_2 \quad VI$$

(ii) when R^2 denotes a group of formula II, a denotes zero,

(iii) when R^2 denotes a group of formula III, a denotes 1, and

(iv) when R^2 denotes a group of formula IIIA, R^3 denotes said monovalent aromatic group of 6 to 20 carbon atoms.

4,977,294

QUATERNARY AMMONIUM PHOSPHATES BASED ON AMINO-FUNCTIONAL POLYESTERS

Guenter Uphues, Monheim; Uwe Ploog, Haan; Wolfgang Becker, Moenchengladbach, and Irmhild Goebel, Dusseldorf, all of Fed. Rep. of Germany, assignors to Henkel Kommanditgesellschaft auf Aktien, Duesseldorf-Holthausen, Fed. Rep. of Germany

Filed Mar. 3, 1989, Ser. No. 319,449

Claims priority, application Fed. Rep. of Germany, Mar. 4, 1988, 3807069

Int. Cl.[5] C07F 9/02

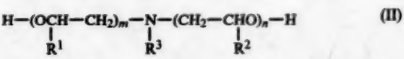
U.S. Cl. 558—208 **7 Claims**

1. A quaternary ammonium phosphate produced by

(a) reacting a dicarboxylic acid of the general formula I,

$$HOOC—R—COOH \quad (I)$$

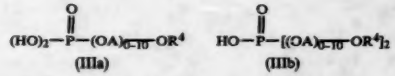
in which R represents an aliphatic, alicyclic or aromatic, substituted or unsubstituted radical containing 1 to 10 carbon atoms, with an alkoxylated tertiary amine of the general formula II,



(II)

in which R^3 represents a saturated or unsaturated, straight-chain or branched, substituted or unsubstituted alkyl radical containing 1 to 20 carbon atoms, R^1 and R^2 are the same or different and represent H or CH_3, m and n are numbers between 1 and 20, with the proviso that the sum of m+n is from 2 and 30, and the degree of polymerization of the polyester is from 2 to 50;

(b) mixing- the amino-functional polyester obtained in the presence of water at about 50° to about 80° C. with a mono- and/or dialkyl phosphoric acid ester of the general formulae IIIa or IIIb



(IIIa) (IIIb)

in which R^4 represents a saturated or unsaturated, straight-chain or branched, substituted or unsubstituted alkyl radical containing 6 to 22 carbon atoms and A represents an alkylene radical containing 2 to 4 carbon atoms, and

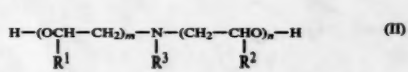
(c) reacting the mixture prepared in step (b) with an alkylene oxide containing 2 to 4 carbon atoms at a pressure between about 1 and about 5 bar and a temperature between about 80° and about 100° C., with the proviso that the polyalkylether chain of the quaternated amine functions contains 1 to 10 alkylene oxide units.

4. A process for the preparation of a quaternary ammonium phosphate comprising;

(a) reacting a dicarboxylic acid of the general formula I,

$$HOOC—R—COOH \quad (I)$$

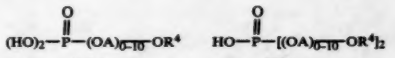
in which R represents an aliphatic, alicyclic or aromatic, substituted or unsubstituted radical containing 1 to 10 carbon atoms, with an alkoxylated tertiary amine of the general formula II



(II)

in which represents a saturated or unsaturated, straight-chain or branched, substituted or unsubstituted alkyl radical containing 1 to 20 carbon atoms, R^1 and R^2 are the same or different and represent H or CH_3, m and n are numbers between 1 and 20, with the proviso that the sum of m+n is from 2 to 30, and the degree of polymerization of the polyester is from 2 to 50,

(b) mixing the amino-functional polyester obtained in the presence of water at about 50° to about 80° C. with a mono- and/or dialkyl phosphoric acid ester of the general formulae IIIa or IIIb



(IIIa) (IIIb)

in which R^4 represents a saturated or unsaturated, straight-chain or branched, substituted or unsubstituted alkyl radical containing 6 to 22 carbon atoms and A represents an alkylene radical containing 2 to 4 carbon atoms, and

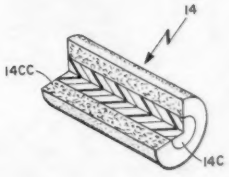
(c) reacting the mixture prepared in step (b) with an alkylene oxide containing 2 to 4 carbon atoms at a pressure between about 1 and about 5 bar and a temperature between about 80° and about 100° C., with the proviso that the polyalkylether chain of the quaternated amine functions contains 1 to 10 alkylene oxide units.

4,977,295

GASKET IMPERVIOUS TO ELECTROMAGNETIC ENERGY

Tim Chin, Norwood, and Susan D. Kohlman, Ayer, both of Mass., assignors to Raytheon Company, Lexington, Mass.

Filed Jul. 28, 1989, Ser. No. 386,059
Int. Cl.[5] H05K *9/00*
U.S. Cl. 174—35 GC 7 Claims



1. A gasket for sealing interstices between electrically conductive elements comprising:

(a) a core comprising a resilient material; and

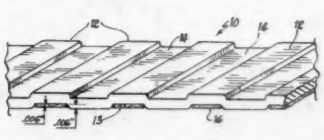
(b) a coating overlying the core, said coating comprising a polythioether impregnated with particles of an electrically conductive material to render the coating electrically conductive.

4,977,296

RADIO FREQUENCY SHIELDING TAPE

Leland H. Hemming, 13329 Canyon Back La., Poway, Calif. 92064

Filed Feb. 23, 1989, Ser. No. 313,874
Int. Cl.[5] H05K *9/00*
U.S. Cl. 174—35 MS 37 Claims



1. A structure for attenuating the passage of electromagnetic energy comprising:

(a) at least two panels made of electromagnetic energy-attenuating materials having adjacent edges thereof disposed in substantially abutting relationship to form at least a portion of an enclosure with a seam defined along a line at which said panels substantially abut;

(b) an electromagnetic-attenuating strip disposed astraddle and lengthwise of said seam and compressed against said panels to substantially seal said seam; and,

(c) said strip defining a plurality of channels extended transversely of said seam to act as waveguides operating beyond cutoff to attenuate electromagnetic energy crossing said seam.

4,977,297

AMORPHOUS COPOLYMERS OF PERFLUORO-2,2-DIMETHYL-1,3-DIOXOLE

Edward N. Squire, Spring Hill, Fla., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del.

Division of Ser. No. 458,012, Dec. 28, 1989, Pat. No. 4,948,851, which is a division of Ser. No. 148,579, Jan. 26, 1988, abandoned, which is a division of Ser. No. 904,095, Sep. 4, 1986, Pat. No. 4,754,009, which is a continuation-in-part of Ser. No. 723,649, Apr. 16, 1985, abandoned, which is a division of Ser. No. 591,486, Mar. 20, 1984, Pat. No. 4,530,569, which is a continuation-in-part of Ser. No. 294,789, Aug. 20, 1981, abandoned. This application Apr. 9, 1990, Ser. No. 509,407
Int. Cl.[5] H05K *1/00*
U.S. Cl. 174—258 3 Claims

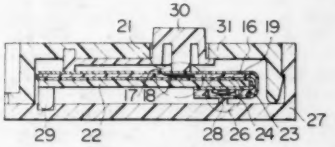
1. A composite substrate for the manufacture of circuit boards manufactured from an amorphous dipolymer of 65-99 mole % of perfluoro-2,2-dimethyl-1,3-dioxole with a complementary amount of tetrafluoroethylene, the glass transition temperature of the dipolymer being at least 140° C.

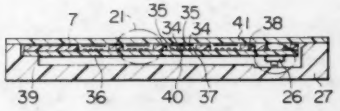
4,977,298

PANEL SWITCH

Terumi Fujiyama, Katano, Japan, assignor to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

Filed Sep. 8, 1989, Ser. No. 404,879
Int. Cl.[5] G06F *3/02;* H01H *13/70*
U.S. Cl. 200—5 A 8 Claims





1. A panel switch comprising:

a casing;

a switch unit carrying thereon a plurality of touch switches, each touch switch which is operated when the touch switch is depressed by a light force and which is sprung back after said light force is removed;

a means for holding said switch unit in said casing, movably in directions in which said touch switches are depressed and sprung back, respectively;

a click mechanism normally urging said switch unit in the directions in which said touch switches are sprung back, said click mechanism giving a click feeling when a manipulating force which is greater than said light force is applied to any one of said touch switches, which has been depressed by said light force, so as to move the switch unit in the direction in which said touch switches are depressed; and

at least one enabling switch which is operated in association with said click mechanism giving said click feeling, for making operation of any one of said touch switches which has been depressed, effective when said enabling switch is operated.

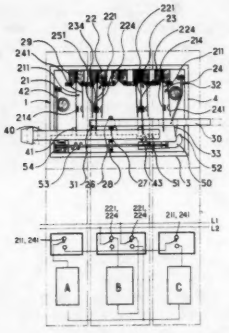
279-054 O.G.-90-15

4,977,299

DOUBLE ACTION SWITCH

José-Maria Perez-Ruiz, Barcelona, and Andres Mendoza-Mendoza, Hospitalet de Llobregat, both of Spain, assignors to Crouzet (Société Anonyme francaise), Montrouge, France

Filed Jun. 27, 1989, Ser. No. 371,790
Claims priority, application France, Jun. 28, 1988, 88 08793
Int. Cl.[5] H01H *9/20*
U.S. Cl. 200—5B **6 Claims**



1. A double interaction switch, comprising:
a casing; and
a plurality of contacts disposed in the casing to be controllable by a monostable lever having one stable position and a bistable lever having two stable positions, each lever being movable from a first position to a second position with respect to the casing by respective first and second actuating members, the bistable lever being formed to be locked in its second position by locking means, the monostable lever being movable to its second position when the bistable lever is also in its second position,
actuation by the second actuating member of the bistable lever, when the lever is in its second position, causing return of the bistable lever to its first position, and
the return, under the action of the first actuating member, of the monostable lever from its second position to its first position, when the bistable lever is in its second position, causing return of the bistable lever to its first position,
wherein said locking means comprises a locking rod cooperating with locking rod engaging means associated with the bistable lever for locking the bistable lever in its second position, the locking rod being mounted in the casing for pivoting therein for action of means for unlocking the bistable lever and thereby freeing the means locking the locking rod from the associated means for locking the bistable lever.

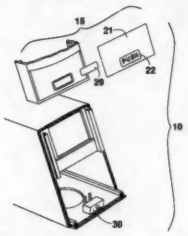
4,977,300

DISPENSER SWITCH

Alfred A. Schroeder, 2811 Whisper Fawn, San Antonio, Tex. 78230

Filed Nov. 21, 1989, Ser. No. 439,487
Int. Cl.[5] H01H *13/14*
U.S. Cl. 200—293 **3 Claims**

1. A pressure-sensitive, electrical button switch system for soda fountain dispenser heads, comprising:
an electrical switch adapted to be mounted onto a dispenser switch housing;
a molded face plate with a recess removably and replaceably attached to said dispenser switch housing;
an actuating member inserted into said recess of said face plate; and
a thin sheet member with a flexible membrane adhesively mounted onto said face plate such that said actuating member is held firmly within said recess with said flexible membrane resting immediately adjacent said actuating



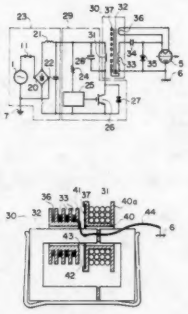
member, and said actuating member maintained at a distance of 0.003 to 0.005 inch from said electric switch.

4,977,301

HIGH-FREQUENCY HEATING APPARATUS USING FREQUENCY-CONVERTER-TYPE POWER SUPPLY

Naoyoshi Maehara; Daisuke Bessyo; Takahiro Matsumoto, all of Nara, and Shigeru Kusunoki, Yamatokoriyama, all of Japan, assignors to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

Filed Oct. 6, 1989, Ser. No. 417,774
Claims priority, application Japan, Oct. 13, 1988, 63-257505; Dec. 12, 1988, 63-313151
Int. Cl.[5] H05B *6/68*
U.S. Cl. 219—10.55 B **10 Claims**



1. A high-frequency heating apparatus comprising
a power supply supplied with electric power from a selected one of a commercial power supply and a battery;
a frequency converter for converting the power of the power supply into high-frequency power;
a boosting transformer for increasing the voltage of the output of the frequency converter, said boosting transformer having a window-frame-shaped core made of a magnetic conductive material, a primary winding and a secondary winding wound around a portion of said core, said primary and secondary windings being adjacent to each other;
a magnetron energized by the output of the boosting transformer; and
a shield member made of a non-magnetic conductive material, said shield member having at least one slit extending in a direction transverse to the winding direction of said primary winding to provide a substantially electrically open loop in the winding direction of the primary winding between the primary and secondary windings, said slit

having a width smaller in the winding direction of said primary winding than twice the shortest distance between said shield member and said primary winding.

4,977,302

BROWNING UTENSIL FOR MICROWAVE OVENS

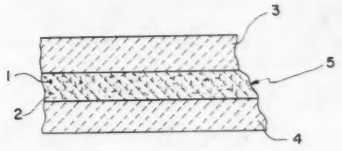
Bernard Merigaud, Saint-Leonhard-de-Noblat; Michel Claus, Solignac, and Robert Passerieux, Limoges, all of France, assignors to Degussa Aktiengesellschaft, Frankfurt am Main, Fed. Rep. of Germany

Filed Dec. 20, 1989, Ser. No. 451,964

Claims priority, application European Pat. Off., Dec. 23, 1988, 88121569.3

Int. Cl.[5] H05B *6/80*

U.S. Cl. 219—10.55 E **14 Claims**



1. A browning utensil for microwave ovens, comprising:
a support base;
a metal-containing coating applied to said support base;
a metal-free glazing applied to said metal-containing coating; and
said metal containing coating, at the time of being applied to said support base, being formed of a mixture have 60 to 85% by weight of a metallic material and 15 to 40 % by weight of a non-metallic material.

4,977,303

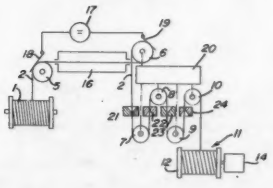
ZINC OR CADMIUM COATED, SURFACE OXIDIZED ELECTRODE WIRE FOR EDM CUTTING OF A WORKPIECE; AND METHOD FOR FORMING SUCH A WIRE

Jean Briffod, Lucinges, France, assignor to Charmilles Technologie S.A., Geneva, Switzerland

Continuation-in-part of Ser. No. 644,966, Aug. 28, 1984, abandoned. This application Jun. 13, 1988, Ser. No. 206,136

Int. Cl.[5] B73H *7/08*

U.S. Cl. 219—69.12 **34 Claims**



1. A method for forming a wire useful as an electrode tool in an EDM apparatus, comprising the steps of:
depositing a coating containing a volatile metal selected from the group consisting of zinc, cadmium and alloys thereof on a wire core, said coating metal being capable of dissusing into a substance comprised in said core upon heating, so as to form an admixed layer on said core;
heating the resulting coated wire in an oxidizing atmosphere at a temperature of at least 700° C. to diffuse at least one of said coating metal and said core substance into the other, and to create an admixed layer of said coating metal and said core substance, said admixed layer having a thickness of about three times that of said initial metal coating, while simultaneously oxidizing the outer surface of said coating metal; and
reducing the diameter of the resulting wire sufficiently to reduce the thickness of said admixed layer by at least about 30 per cent of its initial thickness.

4,977,304

LINEAR SOLID STATE IMAGE SENSOR

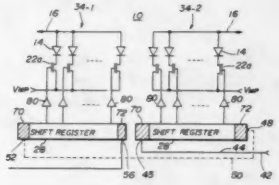
Masumitsu Ino, Yokohama; Mitsuhiro Kohata, Natori; Masanori Itagaki, Yokohama; Takehito Nagata, Yokohama, and Hiroyuki Tanaka, Yokohama, all of Japan, assignors to Ricoh Company Ltd., Tokyo and Ricoh Research Institute of General Electronics Co., Ltd., Natori, both of, Japan

Filed Feb. 6, 1990, Ser. No. 475,800

Claims priority, application Japan, Feb. 9, 1989, 64-28600; Jul. 28, 1989, 64-194303

Int. Cl.[5] H01J *40/14*

U.S. Cl. 250—208.1 **16 Claims**



1. A linear solid-state image sensor, comprising:
a first chip having a long substrate, a plural number of photo-responsive elements formed in a line on said substrate along the direction of the length thereof, an analog switch circuit driving said photo-responsive elements, said analog switch being formed on said substrate, and a shift register shifting signal to make said analog switch circuit successively effective, said shift register being formed upon said substrate,
a second chip having, in the same manner as said first chip, a long substrate, a plural number of photo-responsive elements formed in a line on said substrate along the direction of the length thereof, an analog switch circuit driving said photo-responsive elements, said analog switch being formed on a substrate, and a shift register shifting signal to make the analog switch circuit successively effective, said shift register being formed on said substrate, said second chip being mechanically connected to said first chip so that a shift direction of said shift register circuit being in agreement with a shift direction of said shift register circuit of said first chip,
an external wiring connecting a first stage of the shift register circuit of said first chip and a final stage of the shift register circuit of said second chip, and
an input wiring being formed on said substrate of said second chip and leading signal input from the terminal at the end of the side opposite a connection portion with said first chip to a first stage of the shift register circuit of said second chip.

4,977,305

SYSTEM FOR LOW VOLTAGE PLASMA ARC CUTTING

Wayne S. Severance, Jr., Florence, S.C., assignor to L-Tec Company, Florence, S.C.

Filed Apr. 3, 1989, Ser. No. 332,684

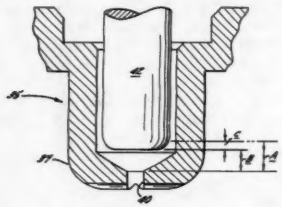
Int. Cl.[5] B23K *9/00*

U.S. Cl. 219—121.39 **12 Claims**

1. A system for plasma arc cutting of thinner workpieces of aluminum, stainless steel and the like using lower operating voltages, and comprising:
a power supply having an open circuit voltage of less than about 80 volts;

a plasma arc torch for being electrically connected to said power supply and having a constricted orifice nozzle and having a gas conduit for receiving a gas supply;

a supply of a gas mixture for being supplied to said torch through said gas conduit as a gas mixture, and wherein said gas mixture comprises a gas that will sustain a plasma arc at the operating voltages of said power supply mixed with a gas which provides good heat transfer characteris-



tics, and wherein the relative proportion of the gas that will sustain the plasma arc present in the mixture is large enough to support the plasma arc and the relative proportion of gas having good heat transfer characteristics present in the mixture is small enough to prevent failure of the arc at the operating voltages of said power supply; and

an electrode in said plasma arc torch that is substantially stable in a plasma formed by the mixture of gases.

4,977,306

HAIR DRYER HAVING ADJUSTABLE HEIGHT AND AIR FLOW

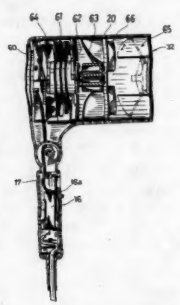
Genji Kosaka, and Keiko Matoba, both of Nara, Japan, assignors to Sharp Kabushiki Kaisha, Osaka, Japan

Division of Ser. No. 228,572, Aug. 5, 1988. This application Oct. 18, 1989, Ser. No. 423,337

Claims priority, application Japan, Nov. 24, 1987, 62-179351; Nov. 27, 1987, 62-181234; Nov. 27, 1987, 62-181235; Nov. 27, 1987, 62-181236

Int. Cl.[5] A45D *20/26*

***U.S. Cl.* 392—380** **3 Claims**



1. A hair dryer comprising:

a handle member;

a cylindrical head member connected to said handle member;

an intake port provided at a first end of said cylindrical head member;

a blow-off port provided at a second end of said cylindrical head member;

a heating mechanism provided adjacent said intake port and inboard of said cylindrical head member;

a blast fan provided inboard of said cylindrical head member and downstream of said heating mechanism;

a pair of adjustable shutter members pivotally mounted at first ends thereof at evenly spaced positions inboard of and with respect to said cylindrical head member adjacent said blow-off port and adjustable between a first position parallel to air flow through said cylindrical head member wherein air flows from substantially the entire cross-sectional area of the blow-off port, and a second position transverse to air flow through said cylindrical head member wherein air flowing from the blow-off port is concentrated at a central portion of said cross-sectional area, said central portion being defined by an opening formed between the evenly spaced pair of shutter members, wherein said pair of shutter members are of a non-permeable structure for entirely blocking passage of air therethrough when introduced into an air flow path thereby entirely directing air flow to the central portion of said cylindrical head member when said pair of shutter members are in said second position; and

means for adjusting said shutter members between said first and second positions.

4,977,307

APPARATUS FOR HEATING SAMPLE WITHIN VACUUM CHAMBER

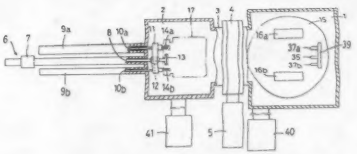
Yoshihiko Motoi, Kyoto; Naoki Yamamoto, Kawaguchi, and Yukio Takano, Musashimurayama, all of Japan, assignors to Horiba, Ltd., Kyoto, Japan

Filed Jan. 17, 1989, Ser. No. 298,558

Claims priority, application Japan, Jan. 20, 1988, 63-11319

Int. Cl.[5] H05B *1/00*

U.S. Cl. 219—392 **13 Claims**



1. An apparatus for heating a sample within a vacuum chamber, comprising:

a preliminary exhaust chamber connected with said vacuum chamber through a gate valve;

a sample stage disposed within said vacuum chamber;

a sample holder detachably disposed on said stage;

said preliminary exhaust chamber being provided with a transfer device for transferring said sample holder between said preliminary exhaust chamber and said vacuum chamber to mount said sample holder on said stage and detach said sample holder from said stage;

said sample holder being provided with a heater and a temperature-measuring element mounted thereon, said heater and temperatureemeasuring element being connected with respective connectors mounted on said sample holder; and

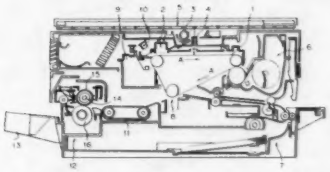
a fixed connector, which is connected with said connectors when said sample holder is mounted on the stage by means of said transfer device, being disposed within said vacuum chamber.

4,977,308

HEAT ROLLER TYPE FIXING DEVICE AND METHOD OF PRODUCING THE SAME

Setsuo Soga, Tokyo, Japan, assignor to Ricoh Company, Ltd., Tokyo, Japan

Filed Jun. 20, 1988, Ser. No. 209,217
Claims priority, application Japan, Jun. 22, 1987, 62-153417; Mar. 16, 1988, 63-60295
Int. Cl.[5] G03G 15/20
U.S. Cl. 219—469 2 Claims



1. In a heat roller type fixing device having a fixing roller and a pressing roller which is rotatable in pressing contact with said fixing roller and which is covered with silicone rubber, said device fixing a toner image to a toner carrier which is moved between said fixing roller and said pressing roller, the improvement which comprises;

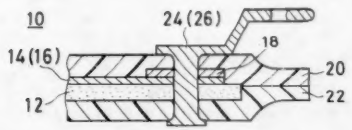
said silicone rubber having a 3- to 15-mer low molecular weight siloxane content of less than 300 parts per million.

4,977,309

ORGANIC PTC THERMISTOR

Katsuyuki Uchida, Nagaokakyo, Japan, assignor to Murata Manufacturing Co., Ltd., Japan

Filed Apr. 6, 1989, Ser. No. 334,079
Int. Cl.[5] H05B 3/02
U.S. Cl. 219—541 9 Claims



1. An organic PTC thermistor:

an organic PTC thermistor sheet;

a pair of electrodes formed on one main surface of said organic PTC thermistor sheet;

a pair of conductive sheets respectively formed on said pair of electrodes at respective terminal fixing locations;

an insulation cover covering at least said conductive sheets and said electrodes; and

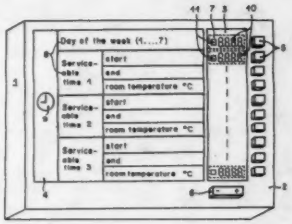
a pair of crimped terminals each penetrating said insulation cover, one of said conductive sheets, the corresponding one of said electrodes, and said organic PTC thermistor sheet.

4,977,310

PROGRAMMABLE CONTROL OR REGULATING DEVICE

Werner Studer, Oberägeri; Stefan Hagmann, Meierskappel, and Marcel Strotz, Baar, all of Switzerland, assignors to LGZ Landis & Gyr Zug, Zug, Switzerland

Filed Feb. 1, 1989, Ser. No. 305,410
Claims priority, application Switzerland, Feb. 2, 1988, 347/88
Int. Cl.[5] G06F 15/20
U.S. Cl. 235—375 12 Claims



1. A programmable regulating device for use in connection with a heating, ventilation, or air conditioning installation comprising:

a microprocessor,

a program and data memory, and

a service panel,

said service panel comprising:

a display having a plurality of display lines,

a label,

a plurality of selection keys, a selection key and a portion of said label being associated with each display line,

an edit key for changing the contents of said display lines,

a plurality of service cards for varying the contents of said label, each of said service cards including label portions corresponding to said display lines and a machine readable encoding field comprising at least one marking for differentiating between service cards, and

a reading unit for reading said markings on said service cards so that said microprocessor receives information by means of said reading unit as to a particular service card assigned to said service panel,

wherein said microprocessor services a particular portion of a program depending on the information as to the particular assigned service card received in said reading unit so as to display information on said display lines corresponding to the label portions of the particular service card.

4,977,311

CAMERA WITH FOCUS DETECTING DEVICE FOR REMOVING VIGNETTING EFFECTS

Yosuke Kusaka, and Ken Utagawa, both of Kawasaki, Japan, assignors to Nikon Corporation, Tokyo, Japan

Continuation of Ser. No. 262,151, Oct. 12, 1988, abandoned, which is a continuation of Ser. No. 77,290, Jul. 24, 1987, abandoned, which is a division of Ser. No. 661,456, Oct. 16, 1984, Pat. No. 4,687,917. This application Apr. 9, 1990, Ser. No. 506,553
Claims priority, application Japan, Oct. 19, 1983, 58-195434; Jan. 31, 1984, 59-15509; Jul. 4, 1984, 59-138809
Int. Cl.[5] G03B 3/00; G01J 1/20
U.S. Cl. 250—201.8 17 Claims

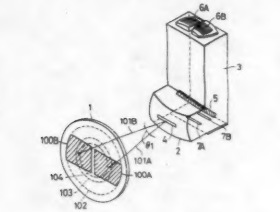
17. A camera comprising:

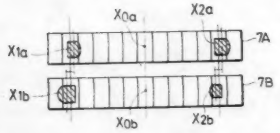
image sensor means having a plurality of photoelectric conversion elements in a light-receiving portion thereof, said photoelectric conversion elements including a one-dimensional array of said elements in a first light-receiving area of said light-receiving portion and a one-dimensional

array of said elements in a second light-receiving area of said light-receiving portion;

optical means for directing two light beams from an object to be photographed to said first light-receiving area and said second light-receiving area, respectively, said image sensor means being responsive to an intensity distribution of the light incident on said photoelectric conversion elements;

displacement detection means responsive to said image sensor means for detecting an amount of displacement between the intensity distribution of one of said beams at each of a plurality of sub-areas in said first light-receiving area and the intensity distribution of the other of said beams in said second light-receiving area and for generating a plurality of displacement detection signals from at least a portion of said sub-areas in said first light-receiving area and from at least a portion of said second light-receiving area, each of which indicates a detected amount of displacement;





correction means for correcting at least one of said plurality of displacement detection signals on the basis of the position of one of said plurality of sub-areas in said first light-receiving area corresponding to said at least one of said plurality of displacement detection signals; and

focus detection means for producing a focus detection signal corresponding to the focus of said photo-taking lens on the basis of at least one corrected displacement detection signal.

4,977,312

PHOTOMETRIC APPARATUS EMPLOYING SOLID-STATE IMAGING DEVICE

Masahiro Juen, Yokohama, Japan, assignor to Nikon Corporation, Tokyo, Japan

Filed Oct. 10, 1989, Ser. No. 419,116

Claims priority, application Japan, Oct. 18, 1988, 63-262367

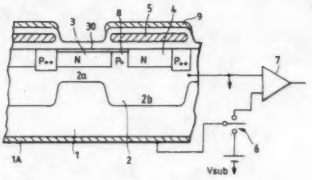
Int. Cl.[5] H01J *40/14*

U.S. Cl. 250—208.1 **14 Claims**

1. A photometric apparatus comprising:

a solid-state imaging device provided with a vertical overflow drain formed from the substrate of said solid-state imaging device;

means for placing said solid-state imaging device in a non-driven state wherein the driving thereof is stopped; and



means for measuring a photoelectric current which flows into said vertical overflow drain in the non-driven state of said solid-state imaging device.

4,977,313

FACSIMILE EQUIPMENT WITH DIRECT-CONTACT-TYPE IMAGE SENSOR

Tatsuya Nagata, Ibaraki; Takehiko Yamada; Eiichi Hara, both of Chigasaki, and Michihiro Watanabe, Tsuchiura, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

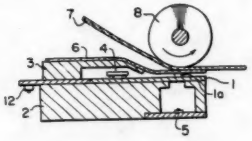
Division of Ser. No. 321,881, Mar. 10, 1989, Pat. No. 4,940,888.

This application May 2, 1990, Ser. No. 517,810

Claims priority, application Japan, Mar. 14, 1988, 63-58310

Int. Cl.[5] H01J *40/14*; H04N *1/024*

U.S. Cl. 250—208.1 **9 Claims**



1. A facsimile equipment comprising:

a direct-contact type image sensor including a plurality of sensor elements, a sensor element mounting substrate, having a surface on which the plurality of sensor elements are mounted and which is light-transmissive at least in the vicinity of portions of the sensor element mounting substrate where said sensor elements are mounted, and an electroconductive transparent film disposed on a surface of said substrate which is adjacent said sensor elements, having a surface facing the sensor elements, the film having one portion disposed in such a manner as to cover the plurality of said sensor elements and another portion adhered to an IC cover within which a sensor driving IC is disposed, said surface of said film facing the sensor elements being formed with fine surface irregularities at least over said sensor elements and at portions in the vicinity of said sensor elements;

an incident light optical path, extending through the light-transmissive portions of the sensor elements mounting substrate from a side of the substrate opposite to the side on which the plurality of sensor elements are mounted, at the location where the sensor elements are mounted; and

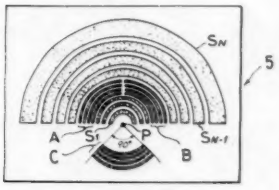
a platen roller disposed on said one portion of the transparent film, capable of forcing an original to come into contact with a side of the electroconductive transparent film opposite to the side thereof closest to the substrate, in the vicinity of the sensor elements, whereby the transparent film is pulled in the direction of said one portion of the transparent film when the roller is rotated to advance the original.

4,977,314

ARCIFORM PHOTOSENSOR ASSEMBLY

Takeshi Niwa, Kyoto, Japan, assignor to Shimadzu Corporation, Kyoto, Japan

Filed Mar. 9, 1989, Ser. No. 321,527
Claims priority, application Japan, Mar. 9, 1988, 63-31401[U]
Int. Cl.[5] H01J 40/14
U.S. Cl. 250—211 R 2 Claims



1. An arciform photosensor array for use in measuring intensity distribution of light rays scattered from a transparent light-scattering sample irradiated with an incident parallel light beam, said arciform photosensor array comprising:

a main photosensor group consisting of main arciform photosensors to be used only to detect said light rays scattered from said sample, said main arciform photosensors being arrayed concentrically with respect to a central point to which a non-scattered component of said incident parallel light beam is to be directed;

a first double-purposed photosensor group doubling as part of means for adjusting said incident parallel light beam so as to be directed to said central point, said first double-purposed photosensor group consisting of double-purposed arciform photosensors arrayed concentrically with said main arciform photosensors, the outermost one of said first double-purposed arciform photosensors having a radius not smaller than that of said incident parallel light beam, and the innermost one of said first double-purposed arciform photosensors having a radius not larger than that of said incident parallel light beam;

a second double-purposed photosensor group doubling as part of means for adjusting said incident parallel light beam so as to be directed to said central point, said second double-purposed photosensor group having the same constitution as that of said first double-purposed photosensor group except for its sector angle; and

a third double-purposed photosensor group doubling as part of means for adjusting said incident parallel light beam so as to be directed to said central point, said third double-purposed photosensor group having the same constitution as that of said first double-purposed photosensor group except for its sector angle;

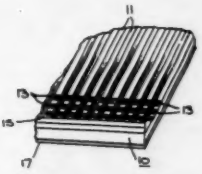
whereby said incident parallel light beam can be directed to said center point by adjusting the relative dispositional relationship between said incident parallel light beam and said arciform photosensor array so as to purposefully balance the signals outputted, with said transparent light-scattering sample removed temporarily, from the double-purposed arciform photosensors belonging to said first, said second and said third double-purposed photosensor groups.

4,977,315

LIQUID CRYSTAL POSITION DETERMINING SYSTEM AND WAND DEVICE

Alexander M. Purcell, Guilford, Conn., assignor to Summagraphics Corporation

Filed Oct. 6, 1989, Ser. No. 417,869
Int. Cl.[5] G01V 9/04; G09G 3/02
U.S. Cl. 250—221 11 Claims



1. A position determining system comprising:

a tablet having a plurality of coplanar spaced substantially transparent first conductor strips, a plurality of coplanar spaced substantially transparent second conductor strips, the plane of said first strips being parallel to and spaced from the plane of said second strips, and a liquid crystal material between said first and second strips;

means for scanning said conductor strips to cause a dark line to propagate across the tablet surface;

said tablet being at least partially light transmissive substantially throughout its extent such that objects on one side of said tablet are visible from its opposite side;

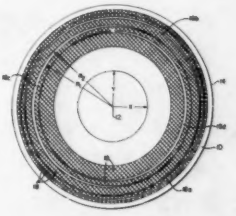
a wand-type device connected to the system and positionable by a user over its opposite side; p1 means connected to the wand-type device for detecting when a dark line crosses under the wand-type device.

4,977,316

ENCODER DISC HAVING A TRACK FORMED BY TWO REGIONS OF DIFFERENT RADII

Timothy M. Malcolm, Conway, and Garland H. Latta, Jr., Searcy, both of Ark., assignors to Aerospace Controls Corporation, Little Rock, Ark.

Filed Sep. 25, 1989, Ser. No. 411,691
Int. Cl.[5] G01D 5/34
U.S. Cl. 250—231.13 20 Claims



1. An encoder disc for an encoder of the type comprising a scanning unit for scanning the disc to measure an angular position characteristic of the disc, said encoder disc comprising:

a disc body;

first and second regions on the disc body, said first region defined between two circles of differing radii and offset centers positioned such that the smaller circle is contained within the larger radius circle, said second region situated adjacent said first region;

said first and second regions having differing characteristics of a scanned parameter;

said first region forming a measuring track which varies in width substantially sinusoidally around the disc body.

4,977,317

RESIN-MOLDED TYPE PHOTOSENSOR

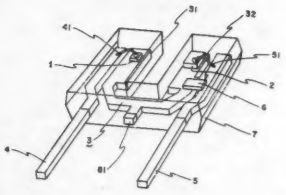
Osamu Iwashima, Tokyo, Japan, assignor to NEC Corporation, Japan

Filed Oct. 27, 1989, Ser. No. 428,130

Claims priority, application Japan, Oct. 27, 1988, 63-272230

Int. Cl.[5] G02B *27/00*

U.S. Cl. 250—239 **4 Claims**



1. A resin-molded type photosensor comprising:

a first lead having one end electrically connected to one of the electrodes of a light-emitting element;

a second lead having one end electrically connected to one of the electrodes of a light-receiving element;

an electrically conductive coupling member connecting the other end of said light-emitting electrode and the other end of said light-receiving electrode; and

a resin package for molding said light-emitting element, light-receiving element and electrically conductive coupling member so as to dispose said first lead, second lead and coupling member in the same plane, the other end of each of said first lead and second lead being led out of said resin package.

4,977,318

PROCEDURE AND MEANS FOR MEASURING RADON CONTENT IN THE AIR

Veikko Ilmasti, Helsinki, and Thor G. Graeff, Tampere, both of Finland, assignors to Ilmasti Elektroniikka Oy, Finland

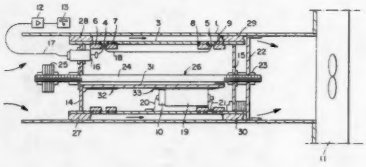
Division of Ser. No. 66,545, Jun. 26, 1987, Pat. No. 4,868,386.

This application Aug. 3, 1989, Ser. No. 338,944

Claims priority, application Finland, Oct. 7, 1986, 864055

Int. Cl.[5] G01T *1/18*

U.S. Cl. 250—253 **2 Claims**



1. Method for continuously measuring radon content in the ambient air at a location, wherein the radon content in the air at said location is measured directly by measuring the ion content in the ambient air caused by the radon and its decay products in the ambient air, without further processing alpha particles to charged particles or by radiation measurement, but rather by solely measuring the ion content in the ambient air by directing negative or positive ions in the ambient air to at least one electrode; and then measuring the current or voltage of said at least one electrode; and displaying the measured current or voltage as radon content.

4,977,319

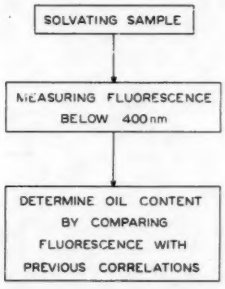
METHOD FOR DETERMINING OIL CONTENT OF AN UNDERGROUND FORMATION

Irwin R. Supernaw, Houston, Tex., assignor to Texaco Inc., White Plains, N.Y.

Continuation-in-part of Ser. No. 201,729, Jun. 3, 1988, abandoned. This application Feb. 3, 1989, Ser. No. 307,118

Int. Cl.[5] G01N *21/64*

U.S. Cl. 250—255 **8 Claims**


SOLVATING SAMPLE
MEASURING FLUORESCENCE BELOW 400nm
DETERMINE OIL CONTENT BY COMPARING FLUORESCENCE WITH PREVIOUS CORRELATIONS

1. A method of evaluating a sample of an underground formation to determine the hydrocarbon content of the formation, which comprises:

solvating a known volume of an underground formation sample in a known volume of a solvent which will solvate hydrocarbons;

quantitatively measuring with a fluorometer the emission fluorescence of the solvated sample below about 400 nanometers at an excitation wavelength at which most petroleum compounds fluoresce; and

determining the hydrocarbon content of any hydrocarbon present in the sample by comparing the emission fluorescence of said solvated sample to previous correlations,

said previous correlations drawn between known hydrocarbon contents of samples and the emission fluorescence of the known samples in said solvent.

4,977,320

ELECTROSPRAY IONIZATION MASS SPECTROMETER WITH NEW FEATURES

Swapan K. Chowdhury; Viswanatham Katta, and Brian T. Chait, all of New York, N.Y., assignors to The Rockefeller University, New York, N.Y.

Filed Jan. 22, 1990, Ser. No. 467,978

Int. Cl.[5] H01J *49/04, 49/10*

U.S. Cl. 250—288 **26 Claims**

1. A system for the analysis of the mass spectra of ions comprising;

(a) a mass analyzer having an inlet orifice means to receive ions to be analyzed

(b) an electrospray ion source connected to said mass analyzer and including;

(i) electrospray means to transport a dilute solution of the molecules of interest and to spray charged micron size droplets of the solution;

(ii) means to impose a voltage of about 1-10 KV on said electrospray means;

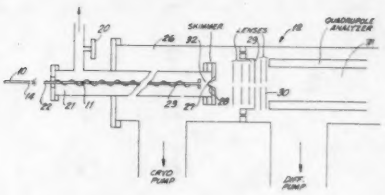
(iii) a capillary tube having an entrance orifice positioned across a gap from said electrospray means to receive said charged droplets, said capillary tube having an exit

orifice; and said gap being without a counterflow of gas therein;

(iv) means to impose a voltage on said capillary tube;

(v) means to heat said capillary tube;

(vi) a skimmer means to focus the ions and having an inlet and an outlet side and an orifice electrically isolated from the capillary tube, said skimmer means orifice



being positioned at a distance from the capillary tube exit orifice;

(vii) a first vacuum chamber enclosing the capillary tube exit orifice and the skimmer orifice and first means to create a vacuum therein;

(viii) a second vacuum chamber enclosing the outlet side of the skimmer and the inlet orifice of the spectrometer and second means to create a vacuum therein,

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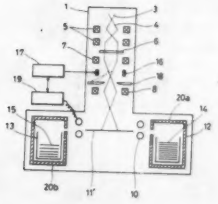
4,977,321

ELECTRON MICROSCOPE WHICH PREVENTS UNDESIRED X-RAY EXPOSURE

Nobufumi Mori, Kaisei, and Tetsuo Oikawa, Akishima, both of Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Oct. 31, 1988, Ser. No. 265,331
Claims priority, application Japan, Oct. 30, 1987, 62-275547
Int. Cl.[5] H01J *37/26*
U.S. Cl. 250—311 **6 Claims**



1. A transmission electron microscope for recording, on a two-dimension sensor in a camera compartment of said transmission electron microscope, an electron image obtained by irradiating a specimen with an electron beam emitted by an electron gun and operated upon by a lens system, comprising:

a diaphragm disposed above said specimen at a predetermined position in a lens system of said electron microscope including a camera compartment below said specimen said diaphragm being selectively used to block an electron beam;

electron beam deflecting means provided above said diaphragm; and

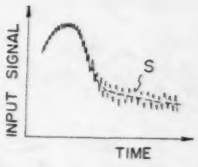
covers for shielding an unexposed two-dimensional sensor and an exposed two-dimensional sensor in said camera compartment from X rays; wherein said diaphragm is disposed above said specimen and wherein said diaphragm has an upper surface provided with an X-ray generation reducing layer and a lower surface provided with an X-ray absorbing layer.

4,977,322

METHOD AND APPARATUS FOR MINIMIZING IMAGE SIGNAL NOISE, AND RADIATION IMAGE READ-OUT METHOD AND APPARATUS

Toshitaka Agano, and Shigeru Sasotome, both of Kanagawa, Japan, assignors to Fuji Photo Film co., Ltd., Kanagawa, Japan

Filed Mar. 30, 1987, Ser. No. 31,740
Claims priority, application Japan, Mar. 28, 1986, 61-70595; Jun. 26, 1986, 61-150226
Int. Cl.[5] G01N *23/04*
U.S. Cl. 250—327.2 **13 Claims**



1. A method of minimizing image signal noise, which comprises the steps of:

(i) feeding an image signal representing an image to a high-frequency component decreasing means capable of arbitrarily decreasing a high-frequency component,

(ii) detecting the level of said image signal, and

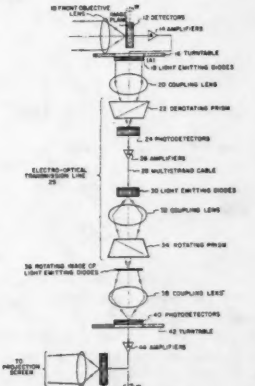
(iii) decreasing the high-frequency component of said image signal by said high-frequency component decreasing means in accordance with a decrease in said level of said image signal.

4,977,323

360 DEGREE INFRARED SURVEILLANCE WITH PANORAMIC DISPLAY

Robert E. Jehle, Silver Spring, Md., assignor to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed Aug. 16, 1973, Ser. No. 390,442
Int. Cl.[5] H01L *25/00;* **G02B** *26/10, 23/02;* **G03B** *37/00*
U.S. Cl. 250—332 **7 Claims**



1. A surveillance system for detecting and displaying infrared producing bodies comprising:

a linear array of infrared detectors mounted along a vertical plane;

first means for rotating said detectors about an axis at a predetermined angular velocity faster than the flicker

fusion rate of the human eye to cause said detectors to scan the horizon in a 360 degree azimuthal plane for infrared radiation;

light emitting diodes connected to said detectors and mounted on said means for rotating for projecting an image of said horizon rotating at said predetermined angular velocity;

an array of photodetectors mounted on a second means for rotating to rotate said array of photodetectors at said predetermined angular velocity to detect said image of said horizon from said light emitting diodes;

additional light emitting diodes connected to said photodetectors and mounted on said second means for rotating for producing a panoramic visual display of said entire 360° azimuthal plane simultaneously.

4,977,324

CHARGED PARTICLE BEAM APPARATUS

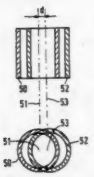
Pieter Kruit, Delft, and Karel D. Van Der Mast, Eindhoven, both of Netherlands, assignors to U.S. Philips Corporation, New York, N.Y.

Filed Apr. 27, 1989, Ser. No. 344,196

Claims priority, application Netherlands, May 9, 1988, 8801208

Int. Cl.[5] H01J *3/20*

U.S. Cl. 250—396 ML **19 Claims**



1. A charged particle beam apparatus comprising:

(a) source means for providing charged particles,

(b) charged particle optical means for controlling displacement of said charged particles,

(c) Variable Axis Lens (VAL) means for transversely displacing an optical axis of said charged particles,

said VAL means including at least two iron-free lenses arranged radially offset with respect to one another, and

(d) carrier means for carrying an object receiving a beam of said charged particles.

4,977,325

OPTICAL READ SYSTEM AND IMMUNOASSAY METHOD

Mark S. Bowen, Medford; Stephen D. Fantone, Lynnfield; Bruce E. Miller, Brighton, and Duane T. Thompson, Franklin, all of Mass., assignors to P B Diagnostic Systems, Inc., Westwood, Mass.

Filed Jul. 12, 1989, Ser. No. 378,647

Int. Cl.[5] G01N *21/64*

U.S. Cl. 250—461.2 **15 Claims**

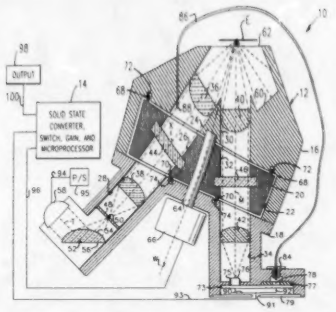
1. An optical system for use in analyzing the concentration of a constituent in a fluid sample or the like by irradiating the sample with excitation energy within a first band of wavelengths, determining the amount of radiant energy emitted by the sample within a second band of wavelengths, and relating the amount of emitted radiation to the concentration of the constituent under investigation, said optical system comprising:

a radiation source for providing light to excite the sample;

excitation and emission optical branches at least one of which includes optical means highly transmissive at the wavelengths corresponding to the light emitted by said radiation source;

solid state photodetector means for receiving radiation along said emission branch and providing an output indicative of the sample emitted radiation;

means positioned along said excitation branch for selectively filtering said radiation source to provide said excitation energy within the first band of wavelengths and means positioned along said emission optical branch for filtering radiation from the sample such that the spectral response of said photodetector means is limited to wavelengths within the second band of wavelengths, said filter means



including at least one matched pair of excitation and emission bandpass filters and means for blocking the passage of light along each of said optical branches, said filter means for selectively filtering or blocking having at least first and second working positions, each of said excitation and emission filters off said at least one matched pair being located in the excitation and emissions branches, respectively, in said first position, and each of the excitation and emission branches being blocked by said blocking means in said second position.

4,977,326

LUMINESCENT SCREEN

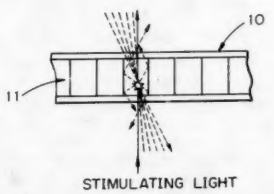
Yasushi Murata, Saitama, Japan, assignor to Pioneer Electronic Corporation, Tokyo, Japan

Filed Jul. 24, 1989, Ser. No. 383,548

Claims priority, application Japan, Jan. 17, 1989, 1-8392

Int. Cl.[5] G21K *4/00*

U.S. Cl. 250—483.1 **2 Claims**



1. A luminescent screen comprising:

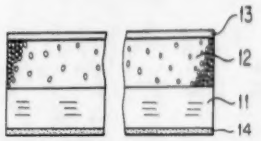
a screen plate made of a mixture of a transparent resin and a luminescent substance dispersed in said transparent resin, said luminescent substance being capable of emitting luminescent light when stimulating light is applied thereto; and

a planar assembly of hollow column-like members having sides thereof intimately fixed together to adjacent members along a height of the members, said planar assembly having a thickness smaller than that of said screen plate and being buried in said screen plate, said resin and luminescent substance filling the interior of said members.

4,977,327
RADIATION IMAGE STORAGE PANEL

Satoshi Arakawa; Masamitu Nonomura; Makoto Ogoda; Shumpeita Torii, and Katsuhiro Kohda, all of Kaisei, Japan, assignors to Fuji Photo Film Co., Ltd., Minami-ashigara, Japan

Continuation of Ser. No. 918,356, Oct. 14, 1986, abandoned.
This application Jul. 14, 1989, Ser. No. 380,682
Claims priority, application Japan, Oct. 14, 1985, 60-228418; Oct. 14, 1985, 60-228419; Oct. 13, 1986, 61-242795
Int. Cl.[5] B32B *5/16*; H01J *1/70*
U.S. Cl. 250—484.1 9 Claims

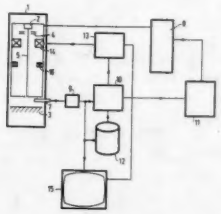


1. A radiation image storage panel comprising a support made of (a) plastic film or paper, (b) a phosphor layer provided on the support which comprises a binder and a stimulable phosphor dispersed therein and (c) a protective layer disposed on the phosphor layer, characterized in that said radiation image storage panel includes only one antistatic layer which comprises at least one conductive material selected from the group consisting of metal oxides, carbon black and conductive organic compounds and has a surface resistivity of not higher than 10^{12} ohm and not lower than 10^{7} ohm, said antistatic layer being provided between the support and the phosphor layer.

4,977,328
METHOD OF DETECTING A MARKER PROVIDED ON A SPECIMEN

Robertus J. M. Van Vucht, Eindhoven, Netherlands, assignor to U.S. Philips Corporation, New York, N.Y.

Filed Feb. 26, 1990, Ser. No. 485,209
Claims priority, application Netherlands, Mar. 2, 1989, 8900510
Int. Cl.[5] G01N *23/225*
U.S. Cl. 250—491.1 6 Claims

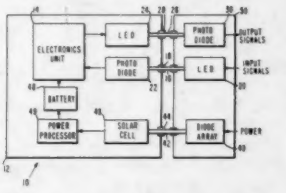


1. A method of detecting a marker provided on a specimen, by means of an electron beam system comprising an electron-optical column with an electron gun which generates an electron beam, the electrons being focussed by means of a lens system and deflected, by way of a deflection element controlled by a deflection unit, in a scanning pattern across a scanning surface of the specimen, electrons dispersed by the specimen being detected by means of a detector which generates a detection signal which is proportional to the number of electrons detected and which is applied to a signal processing unit which is connected to the detector and to the deflection unit, detection signal values I(x, y) being assigned in the signal processing unit to addresses which correspond to coordinates defined with respect to the electron beam system, the signal processing unit determining, using a search procedure, correspondence between the detection signal values and a two-dimensional distribution of intensity values B(x, y) stored in a memory unit which is connected to the signal processing unit, characterized in that the signal processing unit receives user specifications comprising a maximum charge deposition per specimen surface, a magnitude of the scanning surface, and a positioning accuracy value, the signal processing unit making a choice, on the basis of the user specifications and marker properties, between sub-procedures, comprising a level search method and a correlation search method, the sub-procedure offering the shortest detection time being chosen.

4,977,329
ARRANGEMENT FOR SHIELDING ELECTRONIC COMPONENTS AND PROVIDING POWER THERETO

Wilfred O. Eckhardt; Weldon S. Williamson, both of Malibu; Donald J. Hancock, Thousand Oaks, and Ronald R. Robson, Newbury Park, all of Calif., assignors to Hughes Aircraft Company, Los Angeles, Calif.

Filed May 23, 1988, Ser. No. 197,237
Int. Cl.[5] G02B *27/00*
U.S. Cl. 250—551 9 Claims



1. An arrangement for separately shielding individual electronics units and transferring input and output signals and power therebetween, comprising:

a first metallic box encapsulating one electronics unit;

a second metallic box encapsulating another electronics unit;

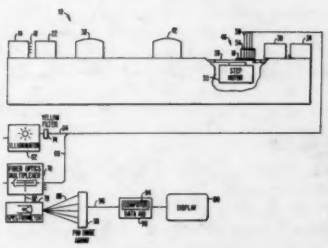
means for transferring control and output signals between the electronics units without providing a path for undesired microwave and millimeter wave radiation to enter the boxes;

means for optically coupling and transferring energy from one electronics unit to another electronics unit to supply power to the other electronics unit.

4,977,330
IN-LINE PHOTORESIST THICKNESS MONITOR

Tom W. Batchelder, 524 8th Ave., Menlo Park, Calif. 94025; Kenneth M. Sautter, 385 Sara Ave., and Gary H. Memovich, 450 N. Mathilda Ave., H103, both of Sunnyvale, Calif. 94086

Filed Feb. 13, 1989, Ser. No. 311,547
Int. Cl.[5] G01N *21/86*
U.S. Cl. 250—560 12 Claims



1. In a device for transporting a semiconductor wafer along a path from a first location to a second location and for coating the wafer with a layer of photoresist as it travels along the

path, an apparatus for measuring the thickness of the photoresist layer comprising:

illuminating means, disposed in close proximity to the path for illuminating a portion of the wafer as it travels along the path:

light receiving means, disposed in close proximity to the path, for receiving the light scattered back from the illuminated portion of the wafer;

light diffusing means, coupled to the light receiving means, for simultaneously diffusing the scattered light into a plurality of light bands having different wavelengths:

light detecting means, disposed in close proximity to the diffusing means, for simultaneously detecting each light band and for providing a corresponding plurality of electrical signals in response thereto; and

calculating means, coupled to the light detecting means, for calculating the thickness of photoresist at the illuminated portion of the wafer from the plurality of electrical signals.

4,977,331

METHOD OF AND APPARATUS FOR DETECTING THE DEGREE OF FILLING OF SUPPLY SPOOLS ON A SPINNING OR TWISTING FRAME

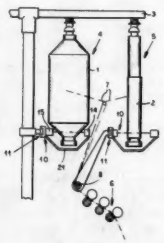
Herbert König, Ebersbach/Fils, and Friedrich Dinkelmann, Rechberghausen, both of Fed. Rep. of Germany, assignors to Zinser Textilmaschinen GmbH, Ebersbach/Fils, Fed. Rep. of Germany

Filed Jul. 31, 1986, Ser. No. 892,719

Claims priority, application Fed. Rep. of Germany, Jul. 31, 1985, 3527473

Int. Cl.[5] G01N *21/86*

U.S. Cl. 250—560 **14 Claims**



1. A method of detecting the degree of filling of supply spools arranged in rows in a spinning or twisting frame, comprising the steps of:

repetitively sensing the diameters of the spool of each row in succession by entraining a respective light curtain for each row continuously back and forth along each of said rows at a given speed with respective flexible elements extending along each of said rows and having a common drive so that said spools of each row interrupt the respective light curtain and detecting an interval of light interruption by each spool;

upon each sensing of the diameter of each of said spools, comparing an actual interruption interval of a light curtain related to an actual diameter and the degree of filling with a preset value corresponding to the diameter of an empty spool plus one winding layer; and

generating a signal representing the need to replace a given spool in response to the comparison of the diameter sensed with said preset value, when said actual interruption interval is shorter than said preset value.

4,977,332

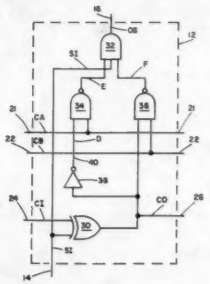
POWER SWITCHING APPARATUS

R. C. White, San Diego, Calif., assignor to Sundstrand Corporation, Rockford, Ill.

Filed May 4, 1989, Ser. No. 347,532

Int. Cl.[5] H01H *47/00*

U.S. Cl. 307—113 **19 Claims**



18. A power switching apparatus, comprising

means for providing a plurality of output signals;

means for receiving a plurality of input signals, each of said plurality of output signals being associated with a logically selected one of said plurality of input signals;

means for causing each of said plurality of said output signals to take the form of one of two partial duty cycle signals in response to receipt of said associated input signal; and

means for assuring that the number of output signals taking the form of a first one of said two partial duty cycle signals is within one count of the number of output signals taking the form of a second one of said two partial duty cycle signals.

4,977,333

POWER SEMICONDUCTOR DEVICE INCLUDING AN ARRANGEMENT FOR CONTROLLING LOAD CURRENT BY INDEPENDENT CONTROL OF A PLURALITY OF SEMICONDUCTOR ELEMENTS

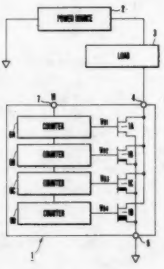
Masayoshi Suzuki, Hitachiota, and Hidesato Horii, Katsuta, both of Japan, assignors to Hitachi, Ltd., Tokyo and Hitachi Automotive Engineering, Ltd., Ibaraki, both of, Japan

Filed Apr. 12, 1989, Ser. No. 337,144

Claims priority, application Japan, Apr. 13, 1988, 63-89082

Int. Cl.[5] H03K *17/12*

U.S. Cl. 307—243 **16 Claims**



1. A power semiconductor device comprising:

a plurality of semiconductor elements which are electrically connected in parallel;

an input and an output terminal for respectively commonly

connecting input and outputs parts of these semiconductor elements, said plurality of semiconductor elements being divided into a plurality of groups;

a plurality of control terminals for each commonly connecting control terminals of the semiconductor elements forming one group; and

counters having output terminals connected to said plurality of control terminals, respectively, said counters including means for counting an input control pulse and outputting on said output terminals output signals in accordance with the counts thereof.

4,977,334

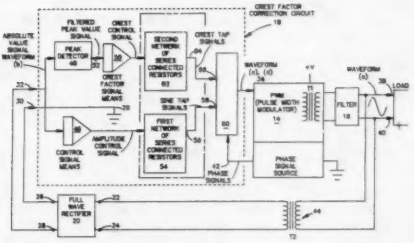
CREST FACTOR CORRECTION CIRCUIT

Howard Handler, Westminster, Calif., assignor to Deltec Electronics Corporation, San Diego, Calif.

Division of Ser. No. 359,356, May 31, 1989, Pat. No. 4,920,472. This application Mar. 20, 1990, Ser. No. 495,990

Int. Cl.[5] H03K *5/00*; H02M *7/538*

U.S. Cl. 307—260 **7 Claims**



1. A crest factor correction circuit responsive to an absolute value signal having a fixed period, and to a periodic sequence of phase signals, said phase signals being characterized to divide each fixed period into predetermined phase intervals, said crest factor correction circuit comprising:

an amplitude control signal means responsive to said absolute value signal for providing an amplitude control signal proportional to the integral of the difference between the absolute value signal and a set reference voltage;

a crest factor signal means responsive to said absolute value signal for providing a crest control signal proportional to the integral of the difference between a filtered peak value of the absolute value signal and a fixed reference voltage;

a series network means responsive to said amplitude control signal and to said crest control signal for providing (1) a first and second series of sine tap signals, each first and second series of sine tap signals having an amplitude that is proportional to the amplitude of said amplitude control signal times the sine of a corresponding phase interval within a respective leading and trailing phase interval of said absolute value signal, and (2) a series of crest tap signals being proportional to the amplitude of the crest control signal times the sine of a corresponding phase interval within a crest phase interval of said absolute value signal; and

a multiplexer means responsive to said periodic sequence of phase signals, to said first and second series of sine tap signals and to said series of crest tap signals for sequentially coupling said first sequence of sine tap signals to an output terminal followed by coupling said series of crest tap signals to said output terminal followed by coupling said second sequence of sine tap signals to said output terminal in a sequential order characterized by said periodic sequence of phase signals.

4,977,335

LOW DRIVING VOLTAGE OPERATION LOGIC CIRCUIT

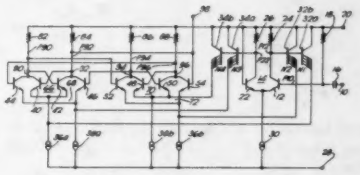
Atsusi Ogawa, Kanagawa, Japan, assignor to Kabushiki Kaisha Toshiba, Kanagawa, Japan

Filed Jul. 5, 1989, Ser. No. 375,615

Claims priority, application Japan, Jul. 11, 1988, 63-172263

Int. Cl.[5] H03K *3/289*

U.S. Cl. 307—272.2 **6 Claims**



1. A low driving voltage operation logic circuit responsive to a power source voltage applied between a pair of power source terminals for modifying an input signal according to a predetermined logic pattern, comprising:

input control means including a plurality of input transistors, for generating a pair of control signals, each having a level opposite to the other, in response to the input signal; and

differential means including a plurality of paired transistors for dividing the frequency of the control signals, the input transistors each having an emitter area substantially larger than the emitter area of each paired transistor, and the logic circuit including only a single base to emitter junction corresponding to each input transistor between the power source terminals.

4,977,336

SCHMITT-TRIGGER CIRCUIT HAVING NO DISCRETE RESISTOR

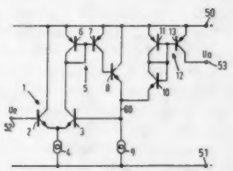
Ingo A. Martiny, Hamburg, Fed. Rep. of Germany, assignor to U.S. Philips Corporation, New York, N.Y.

Filed Mar. 23, 1989, Ser. No. 328,378

Claims priority, application Fed. Rep. of Germany, Mar. 25, 1988, 3810058

Int. Cl.[5] H03K *3/29*; G05F *3/16*

U.S. Cl. 307—290 **9 Claims**



1. A Schmitt-trigger circuit comprising:

an input terminal (**52**);

a first current source (**4**);

a second current source (**9**);

a first current mirror (**5**) having an input and an output;

a coupling means;

a differential amplifier comprising a first transistor (**2**) and a second transistor (**3**), each having a base, an emitter and a collector, the emitters of the first and the second transistors being coupled to the first current source (**4**), the base of the first transistor being coupled to the input terminal, the collector of the second transistor being coupled to the input of the first current mirror (**5**), and the base of the second transistor being coupled to the output of the first

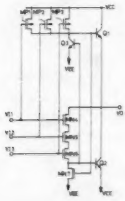
current mirror, characterized in that the coupling means is coupled to the base of the second transistor, to the second current source (9), to the output of the first current mirror via a semiconductor junction (8), and to a first diode array (10, 11), which diode array comprises at least two diode elements in a first current-path which is arranged in parallel with a second current-path comprising the output of the first current mirror and the semiconductor junction.

4,977,337

BI-CMOS LOGIC CIRCUIT

Shigeki Ohbayashi, and Katsushi Asahina, both of Hyogo, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Jan. 9, 1990, Ser. No. 462,378
Claims priority, application Japan, Jun. 13, 1989, 1-150892
Int. Cl.[5] H03K *19/02, 17/16, 5/12*
U.S. Cl. 307—446 **9 Claims**



1. A Bi-MOS logic circuit having at least one bipolar transistor and at least one insulated gate type field effect transistor, comprising:

a first bipolar transistor of a first conductivity type having a first conduction terminal connected to a first power supply potential, a second conduction terminal connected to an output terminal, and a control terminal,

a second bipolar transistor of said first conductivity type having a first conduction terminal connected to said output terminal, a second conduction terminal coupled to a second power supply potential, and a control terminal,

at least one insulated gate type field effect transistor of the first conductivity type disposed between said first power supply potential and said control terminal of said first bipolar transistor, an input signal being applied to a gate of said one insulated gate type field effect transistor of said first conductivity type,

at least one insulated gate type field effect transistor of a second conductivity type disposed between said first conduction terminal and said control terminal of said second bipolar transistor, said input signal being applied to a gate of said one insulated gate type field effect transistor of said second conductivity type,

impedance means disposed between said control terminal and said second conduction terminal of said second bipolar transistor, for setting a potential of said control terminal of said second bipolar transistor to said second power supply potential when said first bipolar transistor is conductive, and

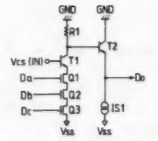
a third bipolar transistor disposed between said control terminal of said first bipolar transistor and said second power supply potential and having its control terminal connected to said control terminal of said second bipolar transistor.

4,977,338

HIGH SPEED BIPOLAR-MOS LOGIC CIRCUIT INCLUDING A SERIES COUPLED ARRANGEMENT OF A BIPOLAR TRANSISTOR AND A LOGIC BLOCK HAVING A MOSFET

Shuuichi Miyaoka, Ohme; Masanori Odaka, Kodaira, and Katsumi Ogiue, Hinode, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Apr. 11, 1989, Ser. No. 336,425
Claims priority, application Japan, Apr. 12, 1988, 63-89620
Int. Cl.[5] H03K *17/04*
U.S. Cl. 307—446 **39 Claims**



1. A logic circuit comprising:

first and second power supply terminals for receiving first and second supply voltages;

an output terminal;

at least one input terminal for receiving an input signal;

load means coupled between said first power supply terminal and said output terminal;

a first bipolar transistor coupled to have a collector coupled to said output terminal, a base coupled to be supplied with a predetermined voltage, and an emitter; and

a first MOSFET coupled to have a source-drain path coupled between the emitter of said bipolar transistor and said second power supply terminal, and a gate coupled to said input terminal,

wherein a plurality of said input terminals are provided, and wherein said logic circuit further comprises:

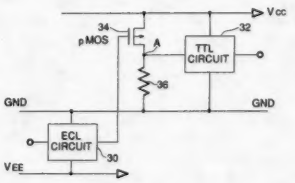
a second MOSFET coupled to have a source-drain path coupled between the source-drain path of said first MOSFET and said second power supply terminal, and a gate coupled to receive an input signal to be supplied to the input terminal different from that coupled to the date of said first MOSFET.

4,977,339

SEMICONDUCTOR INTEGRATED CIRCUIT HAVING A MOS TRANSISTOR WITH A THRESHOLD LEVEL TO ENABLE A LEVEL CONVERSION

Akira Denda, Tokyo, Japan, assignor to NEC Corporation, Japan

Filed Jan. 30, 1989, Ser. No. 303,845
Claims priority, application Japan, Jan. 30, 1988, 63-19751
Int. Cl.[5] H03K *19/094*
U.S. Cl. 307—475 **3 Claims**



1. A semiconductor integrated circuit comprising a positive voltage line, a negative voltage line, a ground line, a first circuit connected between said ground line and one of said

positive voltage line and said negative voltage line so as to be driven by a voltage difference between said ground line and said one of said positive voltage line and said negative voltage line, a second circuit connected between said ground line and the other of said ground line and the other of said positive voltage line and said negative voltage line so as to be driven by a voltage difference between said ground line and said other of said positive voltage line and said negative voltage line, and a signal level conversion circuit including a MOS transistor having a gate connected to an output of the first circuit and a drain connected through a resistor to said ground line, a source of said transistor being connected to said other of said positive voltage line and said negative voltage line, said drain of said transistor being connected to an input of said second circuit, said transistor having a threshold voltage with an absolute value is larger than an absolute value of a voltage difference between said ground line and the other of said positive voltage line and said negative voltage line, so that a signal which appears as said output of said first circuit having a potential which varies between said ground line and said one of said positive voltage line and said negative voltage line is converted into a signal potential which varies between said ground line and said other of said positive line and said negative voltage line, said transistor having as its threshold voltage an absolute value which is substantially equal to a sum of said absolute value of said voltage difference between said ground line and the other of said positive voltage line and said negative voltage line, and an absolute value of a threshold voltage of said first circuit.

4,977,340

DEVICE FOR PROTECTING AN ELECTRICAL CIRCUIT AGAINST INTERFERENCE PULSES

Walter Kohl, Bietigheim, and Karl Nagel, Gomaringen, both of Fed. Rep. of Germany, assignors to Robert Bosch GmbH, Stuttgart, Fed. Rep. of Germany

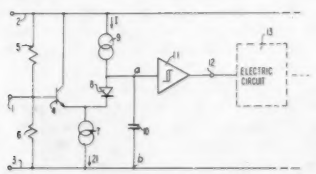
PCT No. PCT/DE87/00216, § 371 Date Nov. 23, 1988, § 102(e) Date Nov. 23, 1988, PCT Pub. No. WO87/07792, PCT Pub. Date Dec. 17, 1987

PCT Filed May 9, 1987, Ser. No. 279,705

Claims priority, application Fed. Rep. of Germany, Jun. 6, 1986, 3619098

Int. Cl.[5] H03K *5/00*

U.S. Cl. 307—520 **11 Claims**



1. A device for protecting input signals of an electric circuit against interference pulses of a higher frequency, comprising

a power source having a first terminal and a second terminal;

an emitter follower including a transistor having its base connected to a source of the input signals, and a first series connection of the collector-emitter path of said transistor with a first current source;

said first series connection being connected between said first and second terminals;

a low-pass member including a second series connection of a second current source and a capacitor means; said second series connection being coupled between said first and second terminals;

a compensating diode having its anode connected to junction point of the second current source with the capacitor means and its cathode connected to a junction point of the first current source with the emitter of the transistor; and

means for applying a signal present at said capacitor means to an input of the electrical circuit.

4,977,341

INTEGRATED CIRCUIT TO REDUCE SWITCHING NOISE

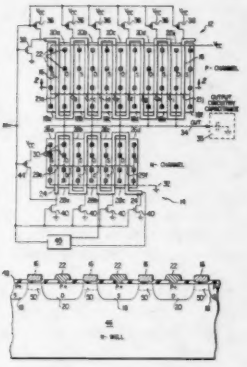
Dale P. Stein, Sherman, Tex., assignor to Texas Instruments, Inc., Dallas, Tex.

Continuation of Ser. No. 901,919, Aug. 28, 1986, Pat. No. 4,771,195. This application Mar. 18, 1988, Ser. No. 170,181

The portion of the term of this patent subsequent to Jul. 4, 2006, has been disclaimed.

Int. Cl.[5] H03K *17/16, 17/687*

U.S. Cl. 307—572 **3 Claims**



1. A transistor circuit comprising:

a substrate including semiconductor surface areas;

a plurality of N-channel sub-transistors formed in said surface areas, said transistors including a shared gate;

a plurality of P-channel sub-transistors formed in said surface areas, said P-channel sub-transistors including a shared gate, each of said P-channel sub-transistors being connected to an associated N-channel sub-transistor at a common drain connection, each P-channel sub-transistor being operable in complementary fashion with its associated N-channel sub-transistor;

each said shared gate having a predetermined resistance and being disposed in said semiconductor surface areas such that a gate signal applied to a first end region of said gate propagates along the length of said gate in a predetermined time interval, the propagation of said gate signal along said shared gate causing graduated turn-on of said sub-transistors;

a conducting device connected to a second end of each said shared gate to allow a transient current to pass from said first end region of said shared gate through said conducting device to cause a voltage drop across said shared gate, said voltage drop reducing the amount of current conducted by said sub-transistors; and

a switching device connected to said conducting device and each said shared gate, said switching device operable to inhibit current through said shared gate a predetermined time after sensing a signal on said shared gate.

4,977,342

ELECTROMAGNETIC VIBRATION GENERATORS

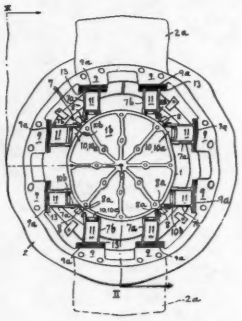
Anthony B. Adams, Litlington Nr. Royston, England, assignor to Ling Dynamic Systems Limited, Royston, England

Filed Apr. 17, 1989, Ser. No. 339,028

Claims priority, application United Kingdom, Apr. 20, 1988, 8809289

Int. Cl.[5] H02K 33/00

U.S. Cl. 310—20 9 Claims



1. An electromagnetic vibration generator comprising an armature suspended by suspension members from a stator and having a coil carried by the armature located in an air gap in the stator, wherein the armature suspension members allow free movement of the armature along its axis of vibration but exhibit a stiffness to lateral movement of the armature and said suspension members are arranged in pairs about the periphery of the armature with the two members of a pair at an angle to each other and the stiffness of one suspension member of each pair restrains turning forces acting on the armature in one direction of rotation whilst the stiffness of the other suspension member of each pair restrains turning forces acting on the armature in the opposite direction of rotation and in which the two suspension members of each pair are so disposed that any torsional force generated in the armature which attempts to cause turning of the armature about its axis of vibration exerts a compressive force on one suspension member of each pair for one direction of said torsional force and a compressive force on the other suspension member of each pair for the opposite direction of said torsional force, said compressive force being exerted on said suspension members in a stiffness direction of said members.

4,977,343

ELECTRIC MOTOR COMMUTATOR SECURED TO ROTOR BY CONFINED EPOXY

Patrick S. Wang, Repulse Bay, Hong Kong, assignor to Johnson Electric S.A., La Chaux de Fonds, Switzerland

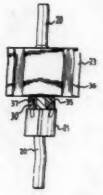
Filed Oct. 12, 1989, Ser. No. 420,255

Claims priority, application United Kingdom, Oct. 13, 1988, 8823993

Int. Cl.[5] H02K 15/00

U.S. Cl. 310—42 2 Claims

1. An electric motor having a rotor comprising a shaft of the motor and an armature lamination stack and commutator mounted on the shaft, wherein a base of the commutator has a recess in an end facing the stack, said recess being defined by a wall of the base which wall has at least one radial slot therein, and a structural coating is provided on the stack, the coating



extending along the motor shaft substantially filling the recess and the slot.

4,977,344

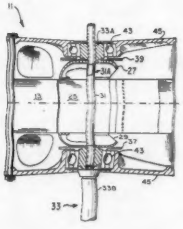
ROTOR ASSEMBLY AND MOTOR CONSTRUCTION

Ilija J. Obradovic, Belgrad, Yugoslavia, assignor to Emerson Electric Co., St. Louis, Mo.

Continuation of Ser. No. 7,608, Jan. 28, 1987. This application Dec. 18, 1989, Ser. No. 452,564

Int. Cl.[5] H02K 1/06

U.S. Cl. 310—217 2 Claims



1. In an electric motor having a stator with an axial bore therethrough, a rotor having an axis of rotation mounted for rotation about that axis of rotation in the bore of the stator, said rotor comprising a plurality of laminations disposed in a stack, the improvement comprising a tension rod extending axially through the rotor lamination stack and means disposed at each end of the rotor lamination stack and secured to the tension rod for compressing the stack to hold the laminations of the stack fixedly in position by compression, said laminations being unbonded with respect to each other, the compressing means including end clamps disposed at each end of the stack, the laminations having a plurality of teeth, the end clamps having a footprint corresponding to the shape of the laminations.

4,977,345

SPRING MOUNTED CARBON BRUSH WEAR INDICATOR

Edward S. Toperzer, Deltona, Fla., assignor to Westinghouse Electric Corp., Pittsburgh, Pa.

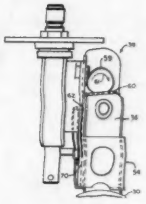
Filed Jan. 25, 1990, Ser. No. 469,975

Int. Cl.[5] H01R 39/58; H02K 13/00

U.S. Cl. 310—242 8 Claims

1. In a dynamoelectric machine having a rotatable shaft, a collector ring axially spaced on the shaft and rotatable therewith, a plurality of stationary carbon collector brushes angularly supported about the collector ring and in sliding contact therewith, said brushes being grouped within a plurality of removable holders such that a portion of said brushes are singularly removable from contact with the collector ring, a

plurality of springs each having one end secured to the brush holder and an opposite end coiled against said brush thereby biasing it against the collector ring such that said springs further coil as said brushes wear, and a distinctive marking associated with each of said springs for visibly indicating when one of said removable holders has worn down a predetermined amount.

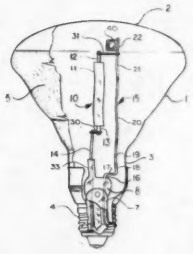


4,977,346

HIGH PRESSURE SODIUM DISCHARGE LAMP HAVING GAS FILLED OUTER ENVELOPE

Ray G. Gibson, Bath, N.Y., and Joseph Droho, Chicago, Ill., assignors to North American Philips Corp., New York, N.Y.

Continuation of Ser. No. 212,803, Jun. 29, 1988, abandoned.
This application Sep. 28, 1989, Ser. No. 414,640
Int. Cl.[5] H01J *61/34, 61/56*
U.S. Cl. 313—25 8 Claims



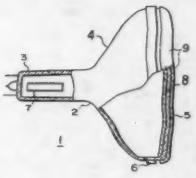
1. A high pressure sodium discharge lamp, comprising:
an outer lamp envelope;
a high pressure sodium discharge device within said outer envelope and energizable by an applied voltage for emitting light;
means comprising conductors within said outer envelope connected to said discharge device for defining a conductive path to apply a voltage to said discharge device;
an inert gas within said outer envelope;
means comprising a normally nonconductive spark gap within said outer envelope, isolated from said inert gas atmosphere within said outer envelope, and responsive to the voltage between said conductors and applied to said high pressure sodium discharge device for breaking down when the applied voltage exceed a certain predetermined value to prevent breakdown through the inert gas atmosphere between said conductors.

4,977,347

COLOR FILTER AND CATHODE-RAY TUBE USING THE COLOR FILTER

Takeo Itou, Kumagaya, and Hidemi Matsuda, Oomiya, both of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Aug. 4, 1989, Ser. No. 389,680
Claims priority, application Japan, Aug. 8, 1988, 63-196091
Int. Cl.[5] H01J *29/89;* G02B *5/22*
U.S. Cl. 313—478 18 Claims



1. A color filter comprising a vitreous material including at least one kind of organic compound having visible light absorbing properties, and at least one metallic compound selected from the group consisting of a Ni compound and a Co compound.

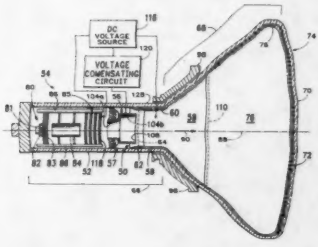
8. A cathode-ray tube comprising a vacuum envelope having a faceplate, the inner surface of which is provided with a phosphor screen, and a color filter formed on the outer surface of said faceplate and comprising a vitreous material including at least one kind of organic compound having visible light absorbing properties, and at least one metallic compound selected from the group consisting of a Ni compound and a Co compound.

4,977,348

ELECTRON DISCHARGE TUBE WITH BIPOTENTIAL ELECTRODE STRUCTURE

Conrad J. Odenthal, Portland, Oreg., assignor to Tektronix, Inc., Beaverton, Oreg.

Filed Mar. 7, 1989, Ser. No. 320,657
Int. Cl.[5] H01J *29/46*
U.S. Cl. 313—479 18 Claims



1. In an electron discharge tube having a tubular envelope with an inner diameter and within which beam producing means is positioned for producing an electron beam directed along a central longitudinal axis, the tube including beam deflecting means overlapping a portion of the tubular envelope for deflecting the electron beam, a bipotential electrode structure for converging the electron beam, comprising:
a layer of electrically resistive material applied to an interior surface of the portion of the tubular envelope overlapped by the beam deflecting means;
a tubular electrode element axially aligned with the central

longitudinal axis and having an outer diameter that is less than the inner diameter of the tubular envelope;

a layer of conductive material applied to the interior surface of the tubular envelope in contact with the electrically resistive layer and overlapping a portion of the tubular electrode element; and

voltage source means for applying a first electrical potential to the tubular electrode element and for applying a second electrical potential to the electrically resistive layer and the conductive layer.

4,977,349

LOW-PRESSURE MERCURY VAPOR DISCHARGE LAMP

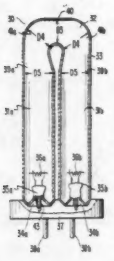
Masahiko Asakura, Yokosuka; Kimio Shiraiwa, Yokohama; Yoichi Hattori, and Naotosi Toume, both of Yokosuka, all of Japan, assignors to Kabushiki Kaisha Toshiba, Kanagawa, Japan

Continuation of Ser. No. 55,055, May 28, 1987, abandoned. This application Sep. 26, 1989, Ser. No. 412,622

Claims priority, application Japan, May 29, 1986, 61-122172

Int. Cl.[5] H01J *61/20, 61/24, 61/30*

U.S. Cl. 313—490 **14 Claims**



1. A low-pressure mercury vapor discharge lamp, comprising:

at least two substantially parallel tube sections for holding a quantity of mercury vapor, said tube sections being exposed to the atmosphere;

sealing means for sealing one end of each of two of the tube sections;

stems disposed at each of said sealed ends of said tubes, at least one of said stems including a receptacle disposed at least partially exterior said tube sections;

connecting tube means for sealingly connecting the other ends of the tube sections to one another in successive pairs, portions of said connecting tube means having diameters that are less than the diameters of corresponding ones of the tube sections; and

an amalgam positioned in the portion of said receptacle that is exterior said tube sections for maintaining the mercury vapor pressure at a level which maintains the luminance of the discharge at a substantially constant value.

4,977,350

COLOR ELECTROLUMINESCENCE DISPLAY PANEL HAVING ALTERNATELY-EXTENDING ELECTRODE GROUPS

Koichi Tanaka, Nara; Takuo Yamashita, Tenri; Satoshi Yamaue, Nara, and Hiroaki Nakaya, Tenri, all of Japan, assignors to Sharp Kabushiki Kaisha, Osaka, Japan

Filed May 11, 1989, Ser. No. 350,513

Claims priority, application Japan, May 11, 1988, 63-115068

Int. Cl.[5] H05B *33/06, 33/26*

U.S. Cl. 313—505 **6 Claims**

1. A color electroluminescence display panel, comprising:

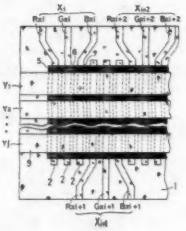
a substrate;

a plurality of first and second electrodes on said substrate;

a luminescence layer interposed between said first and second electrodes; and

an insulating layer interposed between each of said first and second electrodes and said luminescence layer; said first and second electrodes extending substantially orthogonal to each other and being maintained in noncontact relation with each other by said interposed luminescence and insulating layers;

said luminescence layer comprising a plurality of luminescence layer groups, each including a plurality of layer portions of different color luminescence; and



said first electrodes comprising a plurality of electrode groups corresponding to said luminescence layer groups, each including a plurality of electrodes corresponding to said luminescence layer portions of a respective luminescence layer group, all of the plural electrodes of each electrode group extending to the same end portion of said substrate and said electrode groups extending alternately to opposite end portions of said substrate, said first and second electrodes being supplied with a luminescence signal therebetween.

4,977,351

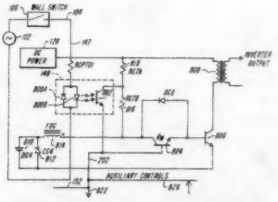
EMERGENCY LIGHTING SYSTEM

Joseph P. Bavaro, Saugus, and Frank M. Nigh, Andover, both of Mass., assignors to Bayco Manufacturing Company, Inc., Saugus, Mass.

Continuation-in-part of Ser. No. 933,266, Nov. 19, 1986, Pat. No. 4,727,291, which is a continuation-in-part of Ser. No. 787,611, Oct. 15, 1985, abandoned. This application Feb. 22, 1988, Ser. No. 158,778

Int. Cl.[5] H02J *9/06*

U.S. Cl. 315—87 **44 Claims**



1. An emergency lighting system for providing illumination from AC power in a normal mode and for providing illumination from a battery in an emergency mode, said system comprising:

at least one gas discharge lamp;

a first DC/AC inverter connected to said lamp;

a DC power supply responsive to said AC power for generating DC power;

inverter control means responsive to an AC control signal

and to a plurality of controls for controlling said first inverter to operate said one lamp from said DC power supply in said normal mode and from said battery in said emergency mode;

a light switch having an open position for manually turning off said one lamp in said normal mode said light switch being connected to said AC power to provide switched AC power; and

means responsive to said switched AC power for generating said AC control signal to turn off said first inverter when said light switch is in said open position.

4,977,352

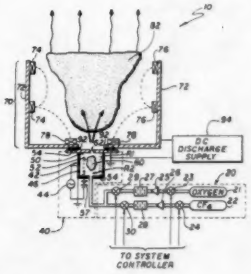
PLASMA GENERATOR HAVING RF DRIVEN CATHODE

Weldon S. Williamson, Malibu, Calif., assignor to Hughes Aircraft Company, Los Angeles, Calif.

Filed Jun. 24, 1988, Ser. No. 211,497

Int. Cl.[5] H05H *1/24*

U.S. Cl. 315—111.81 **17 Claims**



1. An rf driven cathode and gas feed system comprising:

cathode housing means for defining an antechamber, said antechamber having a longitudinal axis;

gas feed means in communication with said antechamber for introducing a gas therein;

antenna means for generating an electric field within said antechamber;

grid means, including a grid mounted within said antechamber defining first and second regions therein, said first region being between said antenna and said grid and said second region being defined at least on one side by said grid, for confining said electric field to said first region of said antechamber to induce a discharge of electrons from said gas within said first region and for allowing said discharged electrons to migrate in a direction transverse to said longitudinal axis to said second region of said antechamber to at least partially ionize said gas within said second region..

4,977,353

COMMUNICATION SYSTEM FOR SINGLE POINT EMERGENCY LIGHTING

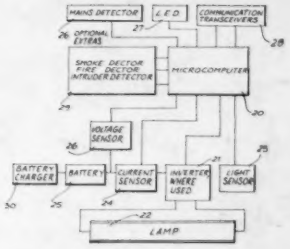
Mohammed A. Helal, and Larry Puckeridge, both of Sydney, Wales, assignors to Minitronics Pty Limited, Brookvale, Australia

Filed Aug. 31, 1989, Ser. No. 401,120

Int. Cl.[5] H05B *37/00, 37/03*

U.S. Cl. 315—130 **5 Claims**

1. An emergency lighting system comprising a plurality of single point emergency lighting units, a cental minitoring and control unit and a communications system interconnecting the lighting units and the central unit, the communications system comprising transceiver units in each lighting unit and the central unit, the transceiver units being connected in a loop topology and each lighting unit being allocated an address by following a protocol initiated by the central unit whereby the central unit transmits a first address number to a first lighting unit in the loop which saves the address number and increments it before passing it on to the next unit in the loop, such that the address number finally passed back to the central unit is indicative of the number of units in the loop.



4,977,354

ELECTRODELESS LOW-PRESSURE DISCHARGE LAMP

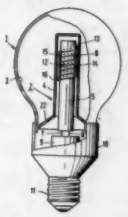
Jozef R. M. Bergervoet, and Leonardus U. E. Konings, both of Eindhoven, Netherlands, assignors to U.S. Philips Corporation, New York, N.Y.

Filed Mar. 1, 1989, Ser. No. 317,374

Claims priority, application Netherlands, Mar. 9, 1988, 8800584

Int. Cl.[5] H05B *41/24, 41/02*

U.S. Cl. 315—248 **5 Claims**



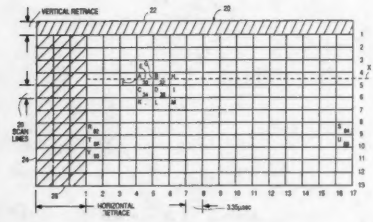
1. An electrodeless low-pressure discharge lamp comprising a translucent lamp vessel sealed in a gas-tight manner and filled with a metal vapor and a rare gas, said lamp having a first winding for generating an electrical discharge in the lamp vessel during lamp operation, said first winding having respective ends and supply wires extending from each end for connection to a high-frequency electric power supply unit, and a second winding which extends at the area of the first winding and has a supply wire and a free end, one of the supply wires of the first winding being electrically connected to said supply wire of said second winding, the potential gradient between the ends of the first winding being substantially equal to that of the second winding during operation, characterized in that ignition antennas are secured to the free end of the second winding and to one end of the first winding.

4,977,355

CONVERGENCE CONTROL SYSTEM

Enrique Rodriguez-Cavazos, Indianapolis; Robert D. Altmanshofer, Carmen, both of Ind.; Robert P. Parker, Westborough, Mass., and Estill T. Hall, Jr., Fishers, Ind., assignors to RCA Licensing Corportion, Princeton, N.J.

Filed Aug. 23, 1989, Ser. No. 397,532
Int. Cl.[5] H01J *29/70, 29/76*
U.S. Cl. 315—368 **20 Claims**



1. A convergence control system, comprising:

means for storing a st of digital grid coordinate values defining a convergence correction grid for a video display means;

multiplying digital to analog converters for calculating analog output values corresponding to said digital grid coordinate values and for calculating intermediate analog output values by analog interpolation between said grid coordinate values, responsive to respective multiplying reference inputs to said converters;

means for combining said analog output values of said converters as a convergence correction waveform corresponding to said grid coordinate values and said intermediate values; and,

means for generating different modulating waveforms as said respective multiplying reference inputs for

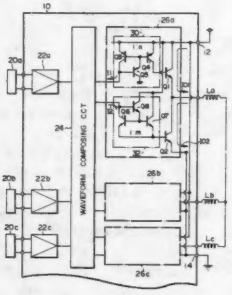
first and second multiplying digital to analog converters for converting said grid coordinate values from digital to analog form, said converters.

4,977,356

DRIVER CIRCUIT FOR D.C. MOTOR

Kenzi Otani, and Fimihiko Ito, both of Kyoto, Japan, assignors to Rohm Co., Ltd., Kyoto, Japan

Filed Feb. 27, 1990, Ser. No. 485,529
Int. Cl.[5] H02K *29/00*
U.S. Cl. 318—138 **5 Claims**



1. A driver circuit for a D.C. motor, comprising:

(a) a first output transistor including an n-p-n transistor connected at a collector to a power source and at an emitter to a stator coil so as to form an inflow path for a driving current from the power source to the stator coil;

(b) a second output transistor including an n-p-n transistor connected at a collector to the stator coil and at an emitter to the ground so as to form an outflow path for the driver current from the stator coil to the ground;

(c) a first current-mirror circuit including a pair of p-n-p transistors in which a collector of an output branch is connected to a base of said first output transistor and in which a driving control signal is supplied to a collector of an input branch transistor; and

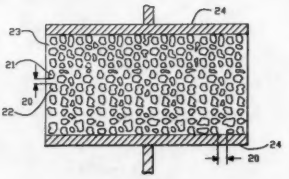
(d) a second current-mirror circuit including a pair of n-p-n transistors in which a common emitter of the two transistors is connected to a base on said second output transistor and in which a driving control signal is supplied to an collector of an input branch transistor.

4,977,357

OVERVOLTAGE PROTECTION DEVICE AND MATERIAL

Karen P. Shrier, 2399 Purisima Creek Rd., Rte. 1, P.O. Box 313H, Half Moon Bay, Calif. 94019

Filed Jan. 11, 1988, Ser. No. 143,615
Int. Cl.[5] H01C *7/10*
U.S. Cl. 338—21 **20 Claims**



1. A material for placement between and in contact with spaced conductors to provide a non-linear resistance therebetween, said material comprising a matrix formed of a said binder and only closely spaced conductive particles:

(a) said closely spaced conductive particles being homogeneously distributed, said particles being in the range 0.1 microns to two hundred microns in size and spaced by said binder to provide electrical conduction by quantum-mechanical tunneling therebetween; and

(b) said binder selected to provide the quantum-mechanical tunneling media between said conductive particles and predetermined resistance between said conductive particles in the absence of quantum-mechanical tunneling.

4,977,358

SWITCHING CIRCUIT FOR VARYING ROTATIONAL SPEED OF MOTOR

Fusao Fushiya; Akiharu Hayashi, both of Anjo; Fumiaki Itsuki, Ibaraki, and Kunio Nagata, Otokuni, all of Japan, assignors to Makita Electric Works, Ltd., Aichi and Omron Corporation, Kyoto, both of, Japan

Filed Apr. 24, 1990, Ser. No. 513,939
Claims priority, application Japan, Apr. 26, 1989, 1-109283
Int. Cl.[5] H02P *5/00*
U.S. Cl. 318—268 **4 Claims**

1. A switching circuit for varying rotational speed of a motor, comprising:

a power supply line for connecting the motor to a power source so as to supply driving power to the motor;

a parallel connecting circuit of an on-off switch and a short circuiting switch provided in said power supply line, in such a manner that the driving power is continuously supplied to the motor when said short circuiting switch is on, while in the case that said short circuiting switch is off,

the driving power is supplied to the motor during on of said on-off switch but is not supplied during off of said on-off switch;

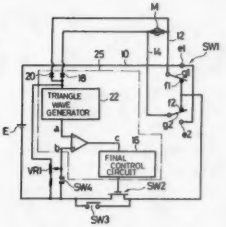
a control member for operation by an operator for varying rotational speed of the motor, said control member being operative for turning on said short circuiting switch at the maximum amount of operation;

output means for producing an output signal corresponding to the amount of operation of said control member;

a continuously conductive switch to be continuously kept on when said control member is operated between the maximum amount of operation and the amount slightly smaller than the maximum amount; and

control means connected to said output means and said continuously conductive switch for controlling said on-off switch, said control means being operative to continuously keep said on-off switch on during the time when said continuously conductive switch is on, and being operative to increase the ratio of the time during which said on-off switch is on to a unit period of cycle based on said output signal from said output means as the amount of operation of said control member increases;

whereby as the amount of operation of said control member increases from the minimum amount to the maximum amount, the ratio of the time to supply power to the motor to the unit period of cycle increases, and thereafter, the power is continuously supplied to the motor when the amount of operation reaches the amount exceeding slightly smaller than the maximum amount of operation by turning of said continuously conductive switch to on and by subsequent turning of said short circuiting switch to on at the maximum amount of operation.



4,977,359

SERVO MOTOR SYSTEM REQUIRING A REDUCED NUMBER OF SIGNAL TRANSMISSION LINES

Kenji Sawai, Nagaokakyo; Tuneto Takeuchi, and Jinichi Ito, both of Komagane, all of Japan, assignors to Omron Tateisi Electronics Co., Kyoto and Kabushiki Kaisha Sankyo Seiki Seisakusho, Nagano, both of, Japan

Filed Nov. 24, 1989, Ser. No. 440,694

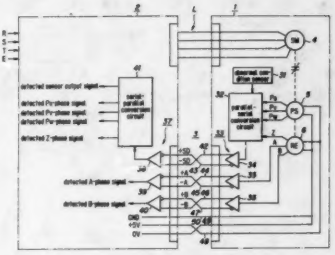
Int. Cl.[5] G05B *13/00*

U.S. Cl. 318—561 **9 Claims**

1. A servo motor system, comprising a servo motor unit, a servo driver unit, power transmission lines for supplying electric power from said servo driver unit to said servo motor unit, and signal transmission lines for supplying electric signals from said servo motor unit to said servo driver unit, wherein:

said servo motor unit comprises: a servo motor; a pole sensor for detecting a magnetic state of said servo motor; a rotary encoder for detecting a mechanical state of said servo motor; a parallel-serial signal conversion circuit for converting an output from said pole sensor and an output from said rotary encoder into a single serial signal; and a line driver for sending out said serial signal through one of said signal transmission lines: and

said servo driver unit comprises: a line receiver for receiving said serial signal transmitted from said line driver through said signal transmission line; a serial-parallel signal conversion circuit for separating said output signals from said rotary encoder and said pole sensor from said serial signal,



and a controller for controlling supply of electric power to said servo motor unit through said power transmission lines according to said separated parallel signals.

4,977,360

METHOD AND CIRCUIT FOR CONTROLLING A POSITION-CONTROLLING DC MOTOR AND A SYSTEM FOR CONTROLLING LINEAR DISPLACEMENT IN ACCORDANCE WITH THE METHOD

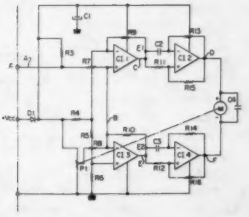
Joël Leleve, Epinay-Sur-Seine, France, assignor to Cible Projecteurs, Bobigny, France

Continuation of Ser. No. 813,616, Dec. 26, 1985, abandoned. This application Aug. 16, 1988, Ser. No. 233,913

Claims priority, application France, Dec. 26, 1984, 84 19804

Int. Cl.[5] G05B *11/06*

U.S. Cl. 318—596 **8 Claims**



7. A circuit for controlling a DC motor in a position servo-control loop in which a position error signal is used to control the motor, said motor having a shaft and an armature with two terminals, said circuit comprising pulse generating means located in a motor control chain for generating a sequence of variable duty ratio pulses adapted, on the basis of said position error signal, to directly control the motor, the pulses delivered by said pulse generating means having a means value which is proportional to the difference between an instantaneous position of the motor shaft and a reference or set stop position thereof, wherein said pulse generating means includes a plurality of comparators configured as relaxation oscillators receiving said position error signal and having their outputs directly connected to one terminal of the motor armature for delivering a sequence of pulses in which said duty ratio varies such that the duration of each pulse is proportional to the value of said position error signal, with the off time between two successive pulses being inversely proportional to the value of said position error signal.

4,977,361

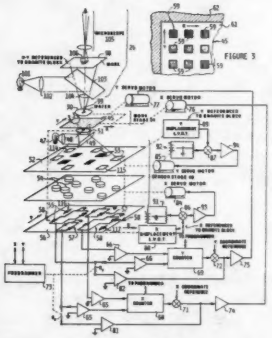
X-Y ADDRESSABLE WORKPIECE POSITIONER AND MASK ALIGNER USING SAME

Edward H. Phillips, Mountain View, and Karl-Heinz Johannsmeier, Los Altos, both of Calif., assignors to Eaton Corporation, Cleveland, Ohio

Division of Ser. No. 568,297, Jan. 5, 1984, Pat. No. 4,687,980, which is a division of Ser. No. 198,364, Oct. 20, 1980, Pat. No. 4,425,537, which is a continuation of Ser. No. 918,713, Jun. 26, 1978, abandoned. This application Aug. 14, 1987, Ser. No. 86,923

Int. Cl.[5] G05B *1/06*

U.S. Cl. 318—640 **54 Claims**



1. An addressable positioner comprising: stage means, movable along a pair of coordinate axes, for holding an object to be positioned;

a two-dimensional array of coordinate addressing indicia, affixed to the stage means, for movement with the stage means, said coordinate addressing indicia being uniformly arrayed in rows parallel to one of the coordinate axes and in columns parallel to the other of the coordinate axes;

sensor means disposed for sensing the coordinate addressing indicia arrayed in rows parallel to said one of the coordinate axes to provide output information determinative of one coordinate of the coordinate position of the stage means and for sensing the coordinate addressing indicia arrayed in columns parallel to said other of the coordinate axes to provide output information determinative of another coordinate of the coordinate position of the stage means; and

control means, responsive to the output information from the sensor means and to input control information, for moving the stage means to coordinate positions determined by the input control information.

4,977,362

PROTECTION METHOD AND PROTECTION DEVICE FOR DETECTING ASYNCHRONISM IN THE SYNCHRONOUS STARTING OF A SYNCHRONOUS MACHINE

Rudolf Mäder, Zurich, Switzerland, assignor to Asea Brown Boveri Ltd., Baden, Switzerland

Filed Sep. 20, 1989, Ser. No. 409,754

Claims priority, application Switzerland, Sep. 27, 1988, 3582/88

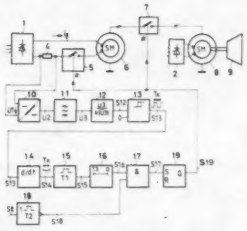
Int. Cl.[5] H02P *5/40*

U.S. Cl. 318—713 **10 Claims**

1. A protection method for detecting asynchronism in synchronous starting of a synchronous machine, in which the synchronous machine, with predeterminable nominal frequency and plant-specific oscillation frequencies caused by phase swings obtains its field or exciter current from an exciter converter, wherein

said exciter current is monitored selectively for the presence of slip frequencies within a frequency range between 2.5 Hz and said nominal frequency, wherein oscillation frequencies less than 2.5 Hz are eliminated, and

at least said exciter current of said synchronous machine is interrupted or switches off, if at least one of said slip frequencies appears in said frequency range between 2.5



Hz and said nominal frequency longer than a predeterminable period of time in a range from 2 seconds to 5 seconds during which no unacceptably high heating of said synchronous machine occurs, and since the starting of said synchronous machine a predeterminable transient time has passed, said transient time being in a range from 1 second to 10 seconds.

4,977,363

OVERHEAT PREVENTING SYSTEM OF A.C. MOTOR

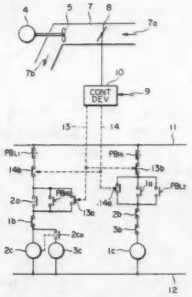
Nobuharu Takada, and Toshihiko Hirosaki, both of Kobe, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Japan

Continuation of Ser. No. 759,452, Jul. 26, 1985, abandoned. This application Mar. 16, 1990, Ser. No. 494,840

Claims priority, application Japan, Jul. 28, 1984, 59-158273; Jul. 28, 1984, 59-158274; Jan. 18, 1985, 60-7703; Jan. 18, 1985, 60-7704; Jan. 18, 1985, 60-7705; Jan. 18, 1985, 60-7706

Int. Cl.[5] H02P *7/48*

U.S. Cl. 318—771 **2 Claims**



1. A system for controlling a motor which drives a fan of a ventilation arrangement having an adjustable vane for regulating wind volume and which operates in one of at least first and second modes of operation, the controlling system comprising:

detector means for generating a first signal when the opening of the vane is greater than a first predetermined value and a second signal when the opening of the vane is less than a second predetermined value;

means for supplying control power; and

first and second circuits connected in parallel across the power supplying means and respectively including first and second switching means responsive to energization by the control power for respectively switching the motor to

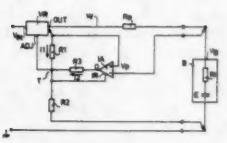
the first and second modes of operation, the first circuit further including a first contact means which closes when the first switching means is energized, second contact means which opens when the second switching means is energized, third contact means which opens in response to the second signal from the detector means, and fourth contact means which closes in response to the first signal and the first circuit having the first switching means and the first, second, and third contact means arranged in series with the fourth contact means arranged in parallel across the first contact means, the second circuit further including a first contact means which opens when the first switching means is energized, a second contact means which closes when the second switching means is energized, third contact means which opens in response to the first signal, and fourth contact means which closes in response to the second signal and the second circuit having the second switching means and the first, second, and third contact means arranged in series with the fourth contact means arranged in parallel across the second contact means.

4,977,364

METHOD AND A TAPER CHARGER FOR THE RESISTANCE FREE CHARGING OF A RECHARGEABLE BATTERY

Karl Kordesch, and Ronald Ujj, both of Graz, Austria, assignors to Battery Technologies Inc., Mississauga, Canada

Filed Apr. 10, 1989, Ser. No. 335,289
Claims priority, application Canada, Apr. 11, 1988, 563842
Int. Cl.[5] H02J 7/10
U.S. Cl. 320—21 **8 Claims**



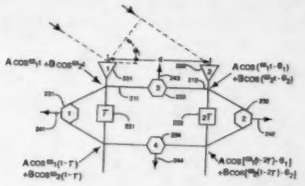
1. A resistance free constant voltage taper charger for batteries, comprising: a voltage regulator means having an input terminal for receiving a first pole of a direct current supply voltage, an output terminal delivering a regulated voltage, and an adjustment terminal; a first resistor between said output and adjustment terminals, said voltage regulator means being of the type capable of maintaining a constant voltage across said first resistor; a second resistor coupled between said adjustment terminal and the second pole of the supply voltage; a third resistor connected to said adjustment terminal; an instrumentation amplifier having an output coupled through said third resistor to said adjustment terminal, a reference input coupled to said adjustment terminal, and a pair of input terminals, said instrumentation amplifier being of the type capable of providing a direct current voltage signal at said output corresponding to the difference of the voltages coupled to said input terminals superimposed onto a voltage level defined by the voltage at said reference input; said output terminal of the voltage regulator means being coupled to a first side of the battery to be charged; the second pole of said direct current supply voltage being coupled to the second side of said battery to be charged; and said input terminals of said instrumentation amplifier being coupled to said output terminal and to said first side of said battery to be charged, so that said voltage output signal of said instrumentation amplifier corresponds to the resistance free voltage of said battery to be charged.

4,977,365

INSTANTANEOUS FREQUENCY MEASUREMENT (IFM) RECEIVER TO MEASURE FREQUENCY AND ANGLE OF ARRIVAL (AOA) OF MULTIPLE SIGNALS

James B. Y. Tsui, Centerville, and William S. McCormick, Dayton, both of Ohio, assignors to The United States of America as represented by the Secretary of the Air Force, Washington, D.C.

Filed Aug. 17, 1989, Ser. No. 396,396
Int. Cl.[5] G01R 23/02
U.S. Cl. 324—78 R **2 Claims**



1. An instantaneous frequency measurement (IFM) receiver having inputs from first and second antennas separated by a distance d; said receiver comprising first and second delay lines having delay times of τ and 2τ respectively; first, second, third and fourth IFM correlators; each correlator having first and second inputs; the first antenna being coupled to the first input of the first correlator, the first delay line and the first input of the third correlator; the second antenna being coupled to the first input of the second correlator, the second delay line and the second input of the third correlator; the first delay line having an output coupled to the second input of the first correlator and the first input of the fourth correlator; the second delay line having an output coupled to the second input of the second correlator and the second input of the fourth correlator; and

digital processing means having inputs coupled to outputs of said correlators for performing mathematical calculations to solve for the frequencies and the angles of arrival of signals at the receiver, with the input frequency correctly paired with its angle of arrival.

4,977,366

HIGH FREQUENCY POWER SENSING DEVICE

Robert C. Powell, Gaithersburg, Md., assignor to Lucas Weinschel Inc., Gaithersburg, Md.

Filed Oct. 7, 1988, Ser. No. 260,501
Int. Cl.[5] G01R 21/04
U.S. Cl. 324—95 **7 Claims**

7. The method of measuring RF and microwave power comprising

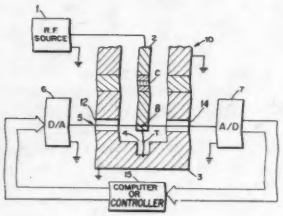
applying a direct current through a conductor across a temperature sensitive resistor to minimize reflected power upon application of RF and higher frequencies,

applying an RF or higher frequency signal to the resistor at right angles to the dc current conductor,

measuring the voltage across the resistor,

adjusting the dc current across the resistor to maintain its resistance constant, and

determining the difference in current and voltage across the resistor from before and then after the application of RF



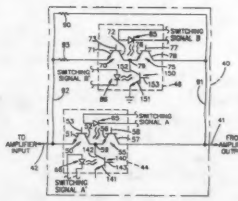
or higher frequency signals as a measure of RF or higher frequency power.

4,977,367

RANGE SELECTOR SWITCH FOR ION CHAMBER INSTRUMENT

Joseph G. Johnston, Newbury, Ohio, assignor to Bicron Corporation, Newbury, Ohio

Filed Jan. 28, 1988, Ser. No. 149,654
Int. Cl.[5] G01R *1/30*
U.S. Cl. 324—115 **1 Claim**



1. An instrument for measuring radioactivity, the instrument including a high gain amplifier having an input and an output, wherein the gain of the amplifier is determined by a portion of the amplifier output fed back into the amplifier input, the amplifier input receiving a small current to be measured, the amplifier output driving an indicator, and a range selector switch connected in series between said input and output, switching of said selector switch changing said portion of the amplifier output fed back into the amplifier input so as to change the gain of the amplifier and thus determine the operating range of the instrument, said range selector switch comprising:

a first switch means having a conducting "on" condition and a non-conducting "off" condition, said first switch means including a first pair of electrodes functioning as switch poles, one of said electrodes of said first pair being connected to said amplifier input;

a second switch means having a conducting "on" condition and a non-conducting "off" condition, said second switch means including a second pair of electrodes functioning as switch poles, one of said electrodes of said second pair being connected to said amplifier output, the other electrode of said first pair being connected to the other electrode of said second pair to provide an interconnection point between said switch means wherein said switch means are in series with each other; and

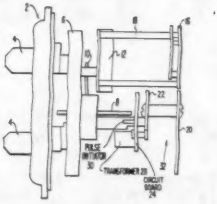
a third switch means having a conducting "on" condition and a non-conducting "off" condition, connected between said interconnection point and the electrical neutral point of said instrument to electrically ground said interconnection point between said switch means only when said first and second switch means are in said non-conducting "off" condition and said third switch means is in said conducting "on" condition, whereby the operating range of the amplifier is accurately controlled by eliminating leakage through the selector switch.

4,977,368

ELECTRIC UTILITY METER WITH ELECTRONIC REGISTER

Mark L. Munday; William P. Doby, both of Raleigh, and Robert A. Loose, Cary, all of N.C., assignors to ABB Power T&D Company, Blue Bell, Pa.

Filed Apr. 26, 1988, Ser. No. 186,425
Int. Cl.[5] G01R *11/02*
U.S. Cl. 324—142 **11 Claims**



1. An electric utility meter comprising: a chassis assembly having means for connecting said meter between a source of electrical power and a consume of the electrical power; a first circuit board permanently installed in said chassis assembly and carrying signal generating means electrically coupled to said means for connecting for providing a signal which is a function of the energy being supplied to the consumer, said first circuit board including a first electrical connector to which the signal is supplied; transformer means mounted on said first circuit board and having a primary connected to said means for connecting in order to receive the voltage from the electrical power source, said transformer means having a secondary connected to said first electrical connector; a front plate member carried by said chassis assembly and bearing legible information identifying the meter; circuit mean for deriving information relating to the rate at which energy is being supplied to the consumer; electrical signal conductor means connected to said circuit means and having a second electrical connector coupled to said first electrical connector for supplying the signal to said circuit means; and an electrically actuated numeric display device electrically connected to said circuit means for displaying the information derived by said circuit means, wherein said circuit means, said electrical signal conductor means, and said display device form a plug-in module which is removable inserted into said chassis assembly behind said plate member so that the legible information is not obscured by said module, and said first and second electrical connectors are disposed to become coupled together as a result of insertion of said module into said chassis assembly.

4,977,369

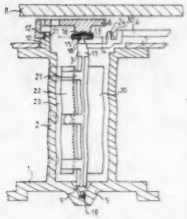
FERROMAGNETIC MEASURING APPARATUS

Jacques Palencher, Troyes, France, assignor to Radio Controle, S.A., Lyons, France

Filed Jan. 12, 1989, Ser. No. 296,548
Claims priority, application France, Jan. 12, 1988, 8800261
Int. Cl.[5] G01R *1/04*
U.S. Cl. 324—154 PB **7 Claims**

1. A ferromagnetic measuring apparatus comprising a coil body including a housing with an exciting coil thereon; a needle; a dial; a shaft fixed to said needle adapted to displace relative to said dial; a first metallic plate connected to said shaft; a second metallic plate provided on said housing and

fixed therewithin; bearing means for pivotally supporting said shaft in said housing for displacement of said shaft with said first metallic plate relative to said second metallic plate in dependence on an amount of electric current flowing through said coil; a cap mounted at one end of said housing, said bearing means including a first bearing formed in the other end of said housing and receiving one end of said shaft and a second bearing formed in said cap and receiving another opposite end of said shaft; and a spiral spring having an inner end fixed to said cap and an outer end connected to said needle.

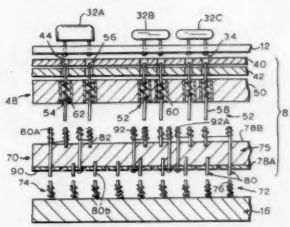


4,977,370

APPARATUS AND METHOD FOR CIRCUIT BOARD TESTING

Harold G. Andrews, Reading, Mass., assignor to Genrad, Inc., Concord, Mass.

Filed Dec. 6, 1988, Ser. No. 280,501
Int. Cl.[5] G01R *31/02*
U.S. Cl. 324—158 F **2 Claims**



1. For fabricating a translator device for conducting signals between a plurality of system contact points in a testing system and a plurality of contact points corresponding to selected locations on a particular unit-under-test (UUT), a method comprising the steps of:

A. providing a translator board including a system face and a UUT face, the system face having a plurality of system locations thereon each associated with one of the system contact points, said system locations positioned for simultaneous registration with said associated system contact points, the translator board further including a plurality of conductive pads provided on said system face, each conductive pad extending through a different one of the system locations;

B. at each of said system locations, mounting a system pin in electrical contact with the associated conductive pad that extends therethrough, the system pins including a plurality of extended system pins and a plurality of non-extended system pins, each extended system pin having a UUT end extending beyond the UUT face;

C. in association with each of said non-extended system pins, inserting a conductive connection post through the translator board so that said connection post has a UUT end at the UUT face and extends, at a position laterally spaced from that of the associated non-extended system pin, from the UUT face through the translator board and into electrical contact with the conductive pad with which the associated non-extended system pin is in electrical contact;

D. in association with each extended system pin and connection post, mounting a UUT pin on the UUT face and providing electrical communication between the UUT pin and the UUT end of the associated extended system pin or connection post; and

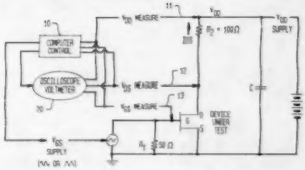
E. computing an optimal location of said UUT with respect to said translator board so as to minimize conflicts between UUT pins and system pins, and maximize the use of extended system pins.

4,977,371

VARIABLE FREQUENCY I-V MEASUREMENT SYSTEM

James D. Oliver, Jr., Belle Mead; Kenneth A. Biles, Union, and Dumrong Kasemset, Hopewell, all of N.J., assignors to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Jan. 6, 1989, Ser. No. 294,240
Int. Cl.[5] G01R *31/26, 31/28*
U.S. Cl. 324—158 T **20 Claims**



1. A variable-frequency I-V measurement system, for testing an IC device having source, drain, and gate terminals, comprising:

a DC power supply for providing a bias voltage across the drain and source terminals of the IC device;

measuring means for measuring at least a voltage developed at, and a current flowing through, the drain terminal in response to an input gate signal applied to the gate terminal, wherein the voltage and current measured by said measuring means represent an I-V characteristic of the IC device;

a gate signal source for providing an input gate signal having a variable frequency to the gate terminal; and

controller means for controlling said gate signal source to provide separately, in sequence, at least two input gate signals of different frequencies in a selected range of frequencies, for operating said measuring means to measure the I-V characteristics of the device in response to each of the two input gate signals, and for deriving a variable-frequency I-V (VFIV) value from the measured I-V characteristics of the device for each of the at least two input gate signals.

4,977,372

TACHOMETER DEVICE HAVING LIMITING MEANS FOR LIMITING FREQUENCY VARIATIONS

Benjamin Eisenberger, Maisons Laffitte, and Pierre Roussel, Neuilly sur Seine, both of France, assignors to Jaeger, Levallois-Perret, France

Filed Feb. 21, 1989, Ser. No. 313,385
Claims priority, application France, Feb. 22, 1988, 8802077
Int. Cl.[5] G01P *3/481*
U.S. Cl. 324—166 **14 Claims**

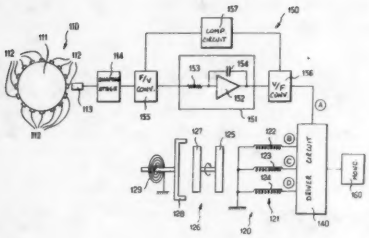
1. A tachometer device comprising a sensor generating an electrical signal at a frequency proportional to a speed to be detected, an operating drive member, and electrical link means connecting the sensor to the operating drive member, wherein

the operating drive member includes a polyphase stepper motor element including a stator having windings and a rotor having a magnet,

and wherein the device further comprises:

a limiting device interposed between the operating drive member and the sensor in order to limit variations in the frequency of the pulses applied to the operating drive member, said limiting device including:

a frequency to voltage converter stage having its input connected to the output of the sensor,



an integrator stage having its input connected to the output of the frequency to voltage converter stage, and

a voltage to frequency converter stage having its input connected to the output of the integrator stage,

a monostable, and

a driver circuit applying pulses generated by said monostable to said windings of the operating drive member in succession and at the rate of the pulses delivered by said voltage-to-frequency converter.

4,977,373

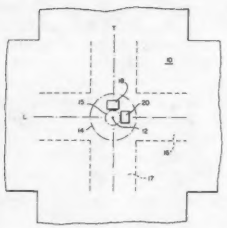
BARKHAUSEN NOISE METHOD FOR DETERMINING BIAXIAL STRESSES IN FERROMAGNETIC MATERIALS

Seppo I. Tiitto, Bethel Park, Pa., assignor to American Stress Technologies, Inc., Pittsburgh, Pa.

Continuation-in-part of Ser. No. 182,622, Apr. 18, 1988, abandoned. This application Apr. 5, 1989, Ser. No. 332,478

Int. Cl.[5] G01B *7/24;* **G01R** *33/12, 35/00;* **G01N** *27/72*

U.S. Cl. 324—209 **5 Claims**



1. A method for determining biaxial stresses in a steel component comprising the steps of

generating a calibration datum (i) from an experimental test piece having metallurgical properties similar to said steel component and (ii) within the elastic limits of said test piece, said calibration datum reflecting varying Barkhausen noise levels as both longitudinal and transverse strains in said test piece are varied from their zero values;

measuring Barkhausen noise levels in the first and second principal directions at a selected location on said steel component; and

using said calibration datum, converting said measured Barkhausen noise levels to values of longitudinal and transverse strain in said first and second principal directions at said selected location on said steel component.

4,977,374

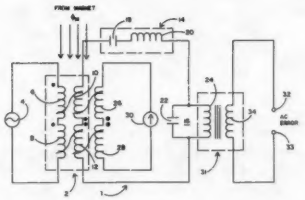
RADIATION HARDENED MAGNETIC VOLTAGE AND/OR CURRENT REFERENCE PRODUCED BY A SATURABLE, TWO CORE TRANSFORMER WITH FIRST HARMONIC NULLING

Charles T. Kleiner, P.O. Box 17879, Anaheim, Calif. 92817

Filed Aug. 21, 1989, Ser. No. 396,232

Int. Cl.[5] G01R *33/04;* **G05F** *1/335*

U.S. Cl. 324—254 **7 Claims**



1. A magnetic based reference to produce a stable voltage or current and comprising:

magnet means to generate a magnetic field;

magnetic field detector means to sense the magnetic field generated by said magnet means and provide an AC output signal that is indicative of the sensed magnetic field;

said magnetic field detector means including a saturable core transformer comprising at least two magnetic cores, each of said magnetic cores having a respective primary and secondary winding wound therearound and a common control winding wound therebetween, the primary windings of said cores being interconnected with one another and the secondary windings of said cores being interconnected with one another, and each of said primary windings being in phase with one another and each of said secondary windings being in phase opposition with one another;

means responsive to the output signal from said magnetic field detector means to provide a fed back current to the control winding which is wound between the cores of the saturable core transformer of said detector means by which to cancel the magnetic field sensed thereby;

load means to receive the fed back current provided to said control winding, such that the current through said load means and the voltage across said load means produce said stable current and voltage, respectively;

AC voltage source means for providing an AC input voltage signal to the primary windings of the cores of said saturable core transformer;

first variable impedance means connected across the primary winding of a first of the two magnetic cores of said saturable core transformer and second variable impedance means connected across the primary winding of the second magnetic core; and

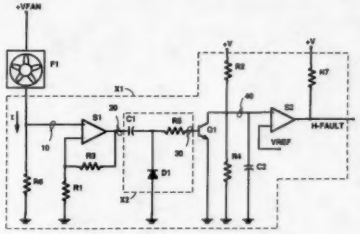
means responsive to the output signal generated by said detector means by which to adjust the impedance of said first and/or second variable impedance means such that the parallel impedance of said first variable impedance means and the primary winding of said first magnetic core is equal to the parallel impedance of said second variable impedance mans and the primary winding of said second magnetic core to thereby null the first harmonic of the AC input voltage signal, such that the AC output signal provided by said magnetic field detector means is the second harmonic of said AC input voltage signal.

4,977,375

FAN OPERATING STATUS SENSING CIRCUIT

Robert B. Toth, Ann Arbor, Mich., assignor to Northern Telecom Limited, Montreal, Canada

Filed Jan. 18, 1989, Ser. No. 298,064
Int. Cl.[5] G01R 31/02
U.S. Cl. 324—511 11 Claims



1. A method for sensing fan operating status using a current monitoring circuit, said method comprising the steps of:

(a) monitoring current flowing through a direct current fan and producing a first signal proportional to the magnitude of said current;

(b) amplifying said first signal to create a second signal;

(c) filtering and clipping said second signal to remove direct current components and to create current pulses;

(d) detecting the presence of said current pulses;

(e) discharging a voltage storage means in response to the presence of said current pulses; and,

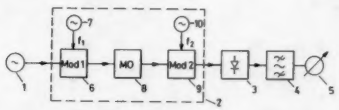
(f) comparing the voltage level of said voltage storage means to a voltage reference, thereby creating a third signal, said third signal providing an indication of the operating status of said fan.

4,977,376

METHOD FOR DISTRUBANCE REDUCTION IN MEASUREMENT SYSTEMS FOR ANALYSIS OF EMISSION OR TRANSMISSION PROCESSES

Burkhard Schiek, Bochum, and Gartner F. Uwe, Heidelberg, both of Fed. Rep. of Germany, assignors to Laboratorium Prof. Dr. Rudolf Berthold, Wildbad, Fed. Rep. of Germany

Filed Aug. 31, 1988, Ser. No. 238,582
Int. Cl.[5] G01R 29/26
U.S. Cl. 324—613 10 Claims



1. A method for disturbance reduction in a measurement system for analyzing an emission or transmission process, which system includes a serial arrangement of a signal source, a measurement path for conducting a component of the signal from the source, a detector for providing an output signal representative of the component conducted by the measurement path and a narrow-band evaluation circuit for evaluating the output signal, and further includes an element for modulating the signal component conducted in the measurement path from the source to the detector, comprising:

modulating the signal component by means of a plurality of modulators each operating at a respectively different individual modulation frequency $f_1 \ldots f_n$;

effecting narrow-band evaluation of the detector output signal at a center frequency f_{BP}, where

$$f_{BP} = |m_1 f_1 + \ldots m_n f_n|$$

and the factors $m_1 \ldots m_n$ may assume the values ± 1, ± 2, $\pm 3 \ldots$; and

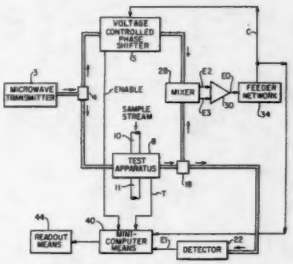
giving the individual modulation frequencies $f_1 \ldots f_n$ and the center frequency f_{BP} respective values such that frequency f_{BP} does not coincide with any one of the individual modulation frequencies or any harmonic thereof.

4,977,377

MICROWAVE WATER CUT MONITOR WITH TEMPERATURE CONTROLLED TEST CELL

Michael G. Durrett; David A. Helms; Gregory J. Hatton, all of Houston; Earl L. Dowty, Katy; John D. Marrelli, Houston; Joseph D. Stafford, Bellaire, and David J. Stavish, Houston, all of Tex., assignors to Texaco Inc., White Plains, N.Y.

Filed Apr. 13, 1989, Ser. No. 337,709
Int. Cl.[5] G01N 22/00
U.S. Cl. 324—640 7 Claims



1. A petroleum stream microwave water cut monitor comprising:

test cell means for containing a reference petroleum multiphase fluid sample and for having a sample stream of a petroleum stream flowing through it,

temperature means connected to the test cell means for maintaining the test cell means at a predetermined temperature,

source means for providing microwave energy,

first antenna means connected to the source means for providing microwave energy into the petroleum sample stream or the reference sample,

second antenna means for receiving microwave energy that has passed through the petroleum sample stream or the reference sample and providing the received microwave energy as test microwave energy,

detector means connected to the second antenna means for detecting the power of the test microwave energy and providing a power signal corresponding thereto, and

indicator means connected to the second antenna means, to the source means and to the detector means for providing an indication of the water cut of the petroleum stream in accordance with the power signal and the phase difference between the source provided microwave energy and the received microwave energy; and

in which the test cell means includes:

a body having at least three channels therein for fluid passage and two channels for microwave energy passage,

fluid source means for providing the reference sample to a first fluid channel,

sample stream receiving means for receiving the sample stream and providing it to a second fluid channel,

temperature control fluid receiving means for receiving the temperature control fluid and providing it to a third fluid channel,

means for allowing the sample stream and the temperature control fluid to exit from the body; and

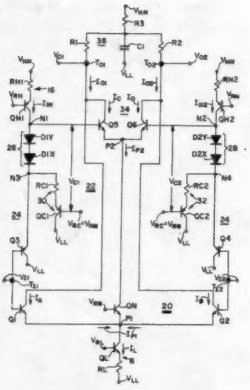
wherein one fluid channel and one microwave channel intersect each other at right angles and the second fluid channel and the other microwave channel intersect each other at right angles.

4,977,378

RAPID-RESPONSE DIFFERENTIAL AMPLIFIER WITH RAIL-TO-RAIL INPUT CAPABILITY

John P. Tero, Saratoga, Calif., assignor to North American Philips Corp., Sunnyvale, Calif.

Filed Sep. 8, 1989, Ser. No. 405,485
Int. Cl.[5] H03F *3/45*
U.S. Cl. 330—258 **18 Claims**



1. An electronic circuit, coupled between sources of first and second supply voltages whose difference is a power supply voltage that defines a supply voltage range, for amplifying an input signal differentially provided between a pair of input terminals, the circuit comprising:

first differential means coupled to the input terminals for amplifying the input signal by largely dividing a first operating current provided at a first supply point into a pair of first intermediate currents whose difference is representative of the input signal when its common-mode voltage V_{CM} is in a part of

second differential means comprising (a) level-shift means coupled to the input terminals for differentially supplying a pair of nodes with a shifted signal whose common-mode voltage is closer to the second supply voltage than is V_{CM}, (b) a level-shift current supply coupled between the source of the second supply voltage and one of the nodes, (c) a level-shift current supply coupled between the source of the second supply voltage and the other node, and (d) amplifier means coupled to the nodes for amplifying the input signal by largely dividing a second operating current provided at a second supply point into a pair of second intermediate currents whose difference is representative of the input signal when V_{CM} is in a part of the supply range extending to the first supply voltage, the two parts of the supply range partially overlapping;

a main current supply coupled between the first supply point and the source of the first supply voltage; and a control amplifier having a first flow electrode coupled to the first supply point, a second flow electrode coupled to the second supply point, and a control electrode responsive to a control voltage for regulating current flow between the flow electrodes; characterized by

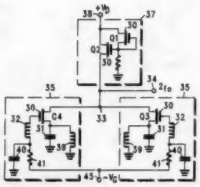
current-steering means for enabling the level-shift current supplies to remain operationally conductive as V_{CM} traverses substantially the entire supply range.

4,977,379

DIFFERENTIAL PAIR, PUSH-PUSH OSCILLATOR

Ronald F. Kielmeyer, Chandle, Ariz., assignor to Motorola, Inc., Schaumburg, Ill.

Filed Jun. 30, 1989, Ser. No. 373,557
Int. Cl.[5] H03B *1/00*
U.S. Cl. 331—56 **25 Claims**



1. A differential pair, push-push oscillator comprising:

(a) first transistor oscillator means having a terminal output for providing a first oscillating output signal f_o; and

(b) second transistor oscillator means having a terminal output for providing a second oscillating output signal f_o;

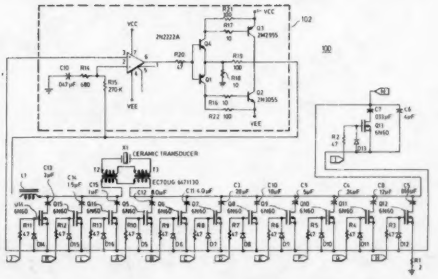
wherein the terminal outputs of the first and second oscillator means are directly connected together to maintain a substantially 180° phase difference between the first oscillating output signal and the second oscillating output signal.

4,977,380

ELECTRONICALLY TUNED ELECTRO-ACOUSTIC POWER OSCILLATOR

Robert J. Martin, Orlando, and Barry L. Lane, Longwood, both of Fla., assignors to Actran Systems, Inc., Orlando, Fla.

Filed Dec. 2, 1988, Ser. No. 279,043
Int. Cl.[5] H03B *5/12*; H03J *5/22*; H04B *11/00*
U.S. Cl. 331—74 **4 Claims**



1. An oscillator comprising:

an amplifier;

an inductor in series with the amplifier;

a pi configured tuning circuit comprising two banks of switched capacitors with a transformer therebetween, said tuning circuit being in series with the inductor;

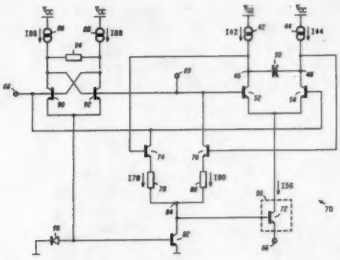
a transducer element driven by said transformer; and

a resistor in series with the tuning circuit.

4,977,381
DIFFERENTIAL RELAXATION OSCILLATOR

William E. Main, Mesa, Ariz., assignor to Motorola, Inc., Schaumburg, Ill.

Filed Jun. 2, 1989, Ser. No. 361,474
Int. Cl.[5] H03K 3/283
U.S. Cl. 331—111 17 Claims



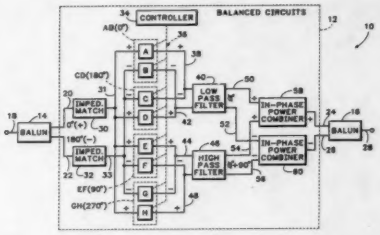
1. An oscillator, comprising:
first current supply means for providing first and second currents at first and second outputs;
second current supply means for providing a current substantially equal to the sum of said first and second currents;
capacitive means coupled between said first and second outputs of said first current supply means for developing first and second dynamic voltages;
switching means having first and second inputs coupled to said first and second outputs of said first current supply means respectively and having an output coupled to said second current supply means wherein said switching means is responsive to first and second complementary control signals for alternately switching the current flow of said first and second currents flowing through said capacitive means;
first means responsive to said first and second dynamic voltages for providing said first and second complementary control signals to control the switching of said switching means wherein the magnitude of the slew rate of said first and second dynamic voltages remains substantially constant for each frequency of operation; and
second means responsive to said first and second dynamic voltages for controlling said first current supply means or said second current supply means to maintain the magnitude of the DC (direct current) voltage developed across said capacitive means at a predetermined value.

4,977,382
VECTOR MODULATOR PHASE SHIFTER

Allen F. Podell, Palo Alto; Scott W. Mitchell; Sanjay B. Moghe, both of San Jose, and Fazal Ali, Santa Clara, all of, assignors to Pacific Monolithics, Sunnyvale, Calif.

Filed Aug. 23, 1988, Ser. No. 235,664
Int. Cl.[5] H01P 1/165, 1/18
U.S. Cl. 333—164 24 Claims

1. A phase shifter for shifting the phase of an input signal by a predetermined amount comprising:
first level adjusting means coupled to receive the input signal and responsive to a first control signal for adjusting the level of the input signal by a first predetermined amount determined by the first control signal;
second level adjusting means coupled to receive the input signal and responsive to a second control signal for adjusting the level of the input signal by a second predetermined amount determined by the second control signal;
means coupled to said second level adjusting means for receiving the associated level-adjusted signal and shifting the phase of the associated level-adjusted signal by 90°;
control means for generating the first and second control signals appropriate for producing the output signal with the predetermined phase when the signals are combined; and

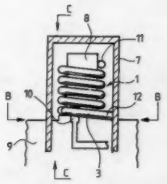


means for combining the input signal the level of which has been adjusted by said first level adjusting means with the 90°-phase shifted input signal the level of which has been adjusted by said second level adjusting means to produce an output signal the phase of which is shifted from the phase of the input signal by the predetermined amount.

4,977,383
RESONATOR STRUCTURE

Erkki O. Niiranen, SF-91100-Ii, Finland, assignor to LK-Products Oy, Kempele, Finland

Filed Oct. 13, 1989, Ser. No. 421,360
Claims priority, application Finland, Oct. 27, 1988, 884953
Int. Cl.[5] H01P 7/00
U.S. Cl. 333—219 10 Claims



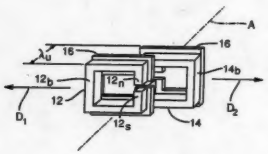
1. A resonator structure comprising:
a printed board of an insulating material;
a helix resonator mounted on the printed board, the helix resonator being formed by a wire wound into a cylindrical coil with a number of turns, one of the turns comprising a straight portion bent in parallel with the surface of the printed board;
a casing surrounding the helix resonator and having at least the inner and outer surface made of an electrically conductive material, and
a micro strip provided on the surface of the printed board, said coil straight portion and said micro strip being selectively placed in mutual engagement and electrically connected at a predetermined position along said straight portion to form a tapping point whereby said micro strip will automatically provide an accurate predetermined tapping of the helix resonator by means of the electrical connection when the helix resonator is mounted on the printed board in a fixed position.

4,977,384

MICROPOLE UNDULATOR

Roman O. Tatchyn, Palo Alto, Calif.; Paul L. Csonka, Eugene, Oreg., and Jay T. Cremer, Burlingame, Calif., assignors to The Board of Trustees of the Leland Stanford Junior University, Stanford, Calif.

Filed Nov. 25, 1988, Ser. No. 276,261
Int. Cl.[5] H01F 7/00
U.S. Cl. 335—210 **33 Claims**



1. An undulator for causing transverse undulations in the trajectory of a charged particle travelling along in a substantially linear trajectory that is in close proximity to the undulator core surface, the undulator comprising:

a row of magnetic elements extending alongside and parallel to an undulator axis which is positionable substantially to coincide with the trajectory of moving charged particles, alternate elements of the row being adapted to provide oppositely directed magnetic fields extending across the axis; and

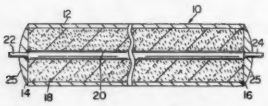
a plurality of spacers which are located between the magnetic elements and are made of a superconducting material.

4,977,385

DISTRIBUTED RTD

Malcolm M. McQueen, 28 Rolling Wood La., Fallbrook, Calif. 92028

Filed Apr. 23, 1986, Ser. No. 854,802
Int. Cl.[5] H01C 7/10
U.S. Cl. 338—24 **56 Claims**



1. Distributed RTD sensing means comprising a matched pair of distributed RTD sensing devices each of which is suitable for interrogating an extended field and comprises:

an elongated, thin, tubular outer protective sheath,

an elongated body of electrical insulation material contained within said sheath and extending longitudinally generally coextensively with said sheath,

elongated RTD filament means supported within said insulation body and extending longitudinally within said insulation body and said sheath,

said RTD filament means along its length being physically separated and electrically insulated from said sheath by said insulation body,

said RTD filament means having end means which is electrically connectable to detection circuitry from at least one end of said sheath, and

elongated, electrically energizable heater means supported within said insulation body and extending longitudinally generally coextensively with said RTD filament means,

said heater means along its length being transversely physically separated and electrically insulated by said insulation body from said RTD filament means and from said sheath,

said heater means having end means which is electrically connectable to an electric power source for energization of said heater means,

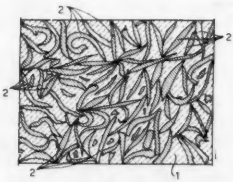
said matched pair of RTD sensing devices being arranged in a spaced, generally parallel array and deployed over an extended field having nonuniform thermal response characteristics, one of said sensing devices having its said heater means unenergized so that it serves as a thermal reference, and the other of said sensing devices having its said heater means energized so as to be responsive to such characteristics with a signal output which, when compared with the signal output of said unenergized sensing device, provides physical information about said field.

4,977,386

ELECTRIC RESISTOR PRODUCIBLE IN A WIDE RANGE OF SPECIFIC RESISTANCE VALUES, AND RELATIVE MANUFACTURING PROCESS

Paolo Lodini, Turin, Italy, assignor to Leda Logarithmic Electrical Devices for Automation S.R.L., Turin, Italy

Filed Sep. 23, 1988, Ser. No. 248,493
Claims priority, application Italy, Oct. 13, 1987, 67862 A/87
Int. Cl.[5] H01H 11/00
U.S. Cl. 338—114 **14 Claims**



1. An electric resistor designed for use as an electric conducting element in an electric circuit, said resistor comprising:

a matrix formed from flexible, insulating material;

particles of ferromagnetic metal distributed uniformly inside the said matrix, said particles being constituted by mechanical machining chips produced by passing a tool comprising agglomerates of abrasive granules over the surface of a workpiece, said particles being magnetized by the said passage of the said tool over the surface of the workpiece, said particles having a maximum size ranging from approximately 20 to 400 microns; and

said flexible, insulating material of said matrix is in such a state of triaxial precompression which is generated by elastic deformation of said material and which, in the absence of external pressure on the resistor, exerts on said particles sufficient pressure for maintaining contact between the particles in the matrix and permits current flow therethrough with current densities as high as a few A/cm^2.

4. A process for producing an electric resistor designed for use as an electric conducting element in an electric circuit, said process comprising the steps of:

obtaining metal particles from mechanical machining chips produced using tools comprising agglomerates of abrasive granules and which are passed over the surface of a workpiece, the step of obtaining said particles including a first step of separating liquid components of said chips from the solid components, a second step of drying said solid components to produce said agglomerates, and a third step of separating said agglomerates into said metal particles;

preparing a homogeneous system composed of a liquid material which, when solidified, is both flexible and electrically-insulating, and said metal particles, in at least a first stage; and

solidifying said liquid material in at least a second stage so as

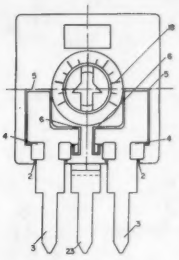
to form a matrix in which the said particles are distributed uniformly.

4,977,387

ADJUSTING POTENTIOMETER FOR ELECTRONIC CIRCUITS, PROCESS FOR ASSEMBLING THE ELEMENTS THEREOF AND PROCESS FOR OBTAINING THE RESISTIVE PLATE THEREOF

Emelio C. Molia, Saragossa, Spain, assignor to Aragonesa de Componentes Pasivos, S.A., Saragossa, Spain

Filed Mar. 14, 1989, Ser. No. 323,332
Claims priority, application Spain, Mar. 21, 1988, 8800858
Int. Cl.[5] H01C *10/34*
U.S. Cl. 338—174 10 Claims



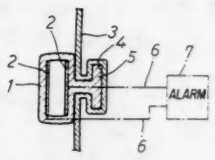
1. A potentiometer, comoprising a parallelepiped casing formed from charged polymers having a high dielectric strength, a resistive plate housed in said casing, a rotor-actuated cursor acting on said resistive plate, two terminals and a collector, wherein said casing comprises first holes for admitting portions of the two terminals thereby to effect electrical contact between the terminals and the resistive plate, said casing further comprising externally projecting lugs of a plastically deformable material fixing the two terminals on the casing, said collector extending across one face of said casing and having arms clamped into corresponding recesses formed on adjacent faces of said casing, said casing comprising a face opposite that across which the collector extends, said opposite face comprising a dial enclosing a hole in which the rotor moves, said hole having a beveled mouth to facilitate assembly of the rotor in the casing.

4,977,388

CONTACT PROTECTING AND ALARMING DEVICE FOR A VEHICLE

Heung Jong Park, 410-4 Beon 1-Dong, Dobong-Ku, Seoul, Rep. of Korea (132-061)

Filed Dec. 29, 1988, Ser. No. 291,496
Claims priority, application Rep. of Korea, Dec. 29, 1987, 23541/1987
Int. Cl.[5] B60Q *1/00*
U.S. Cl. 340—436 3 Claims



1. A protecting and alarming device for a vehicle, comprising:

an air tube with predetermined compressed air filled in the interior thereof;

contacting means including a pair of contact plates disposed in the longitudinal direction of both internal walls of said air tube;

fixing means including a fixing slot and a fixing piece formed longitudinally at the back side of said air tube and being inserted within said fixing slot, said fixing slot formed on a surface plate of a car body in a manner corresponding to said fixing piece;

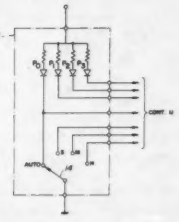
and an alarming device which is connected electrically with said contact plates by lead wires.

4,977,389

INDICATOR AND METHOD OF INDICATING TROUBLE

Yasuhiro Shiraishi, Zama, Japan, assignor to Nissan Motor Co., Ltd., Japan

Continuation of Ser. No. 23,974, Mar. 11, 1987, abandoned, which is a continuation of Ser. No. 730,564, May 6, 1985, abandoned. This application Jul. 6, 1988, Ser. No. 217,045
Claims priority, application Japan, May 8, 1984, 59-67703[U]
Int. Cl.[5] B60Q *1/00*
U.S. Cl. 340—461 7 Claims



1. In an automotive vehicle having a plurality of indicator lights each having on and off indicating statuses for indicating operating states of a predetermined system installed in the automotive vehicle, a method of indicating fault conditions in a plurality of different components installed in the automotive vehicle utilizing the plurality of indicators of the predetermined system, the method comprising the steps of:

assigning a predetermined identifying number to each of the components,

providing condition signals representing the operating states of the components,

producing coded signals from the condition signals representing a fault or a no-fault condition of each of the components according to the code used for generating the coded signals, and

supplying said coded signals to the plurality of indicator lights to actuate the plurality of indicator lights in combination according to the code such that the on and off statuses of the indicator lights indicate in a coded form the number of a component in a fault or a no-fault condition.

4,977,390

REAL TIME METHOD FOR PROCESSING ALAARMS GENERATED WITHIN A PREDETERMINED SYSTEM

Charles H. M. Saylor, Manlius, and Kamal Jabbour, Syracuse, both of N.Y., assignors to Niagara Mohawk Power Corporation, Syracuse, N.Y.

Filed Oct. 19, 1989, Ser. No. 423,872
Int. Cl.[5] G08B *19/00*
U.S. Cl. 340—521 18 Claims

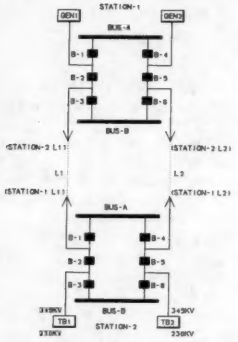
1. A method for processing a set of alarms generated by a fault in one or more components of a predetermined system, said method comprising the steps

(a) providing a computer database representative of all com-

ponents of the system capable of faulting and the interconnections between said components;

(b) defining rules that relate component faults to generated alarms and to propagation of component faults within the system;

(c) determining individual alarm patterns generated by separate failure of each component within the system using said representative database of components and interconnections and said rules relating component faults to alarms;



(d) storing in computer means said individual alarm patterns determined for each component of the system;

(e) accomplishing steps (a)–(d) before said set of alarms to be analyzed is generated; and

(f) comparing each stored alarm pattern with the generated set of alarms and ascertaining those components whose individual alarm patterns are a subset of the set of alarms, said components being potential faulted components of the system.

4,977,391

SAFETY DEVICE FOR A DISTRIBUTOR MEMBER CONNECTED TO A DISTRIBUTED PRODUCT TOTALIZING ELEMENT

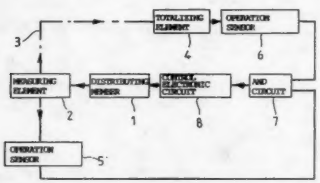
Michel J. L. Coquerel, Calvados, France, assignor to Equipement Industriel Normand, Calvados, France

Filed Dec. 18, 1989, Ser. No. 452,039

Claims priority, application European Pat. Off., Dec. 18, 1988, 88403239

Int. Cl.[5] G08B *19/00*

U.S. Cl. 340—522 **9 Claims**



1. A device providing for an automatic safety of a transmission connection between a measuring element (2) of a distributor member (1) and a totalizing element (4) for totalizing a product distributed by said distributor member, wherein the measuring element (2) and the totalizing element (4) are each respectively connected to an operation sensor taken among two operation sensors (5 and respectively 6), with each of said two operation sensors supplying respectively an information on one input (7*a*, 7*b*) of a two input AND management circuit (7), said AND management circuit being connected to a control member (8) for said distributor member (1), whereby stopping said distributor member in lack of information from at least one of the two operations sensors.

4,977,392

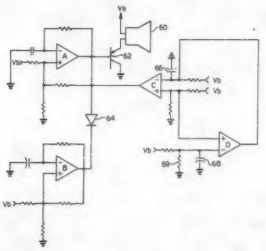
SECURITY ALARM SYSTEM AND SWITCH

Michael A. Loda, 2219 Walnut Ct., Hanover Park, Ill. 60103

Filed May 15, 1989, Ser. No. 351,542

Int. Cl.[5] G08B *13/08, 13/14*

U.S. Cl. 340—568 **12 Claims**



1. An alarm system for detection of the movement of an object comprising:

a housing;

a lever arm having a sensing extremity and a contact extremity, said lever arm being pivotally mounted intermediate said extremities;

extensible means under tension affixed to said housing and said lever arm for urging said lever arm about said pivot and causing said contact extremity to close electrical contacts; and

electronic means for generating a pulsating audible tone upon closing of said electrical contacts, said electronic means including;

an annunciator device, a first oscillator circuit coupled to said annunciator to generate a tone therefrom, and a second oscillator for periodically disabling said first oscillator to provide a pulsing effect, and said electronic means further comprising;

a first timing circuit for disabling said first oscillator circuit after a first set time delay and a second timing circuit for enabling said first oscillator after a second set time delay.

4,977,393

METHOD AND APPARATUS FOR MONITORING THE CONDITION OF CHARGE OF A BATTERY CONNECTED TO AN APPLIANCE AND INCLUDING COUNTERS COUNTED WITH RESPECT TO THE TIME AND DRAIN OF THE BATTERY

Werner Arnold, Nuremberg, and Peter Grundl, Erlangen, both of Fed. Rep. of Germany, assignors to Diehl GmbH & Co., Nuremberg, Fed. Rep. of Germany

Filed Jun. 8, 1989, Ser. No. 364,072

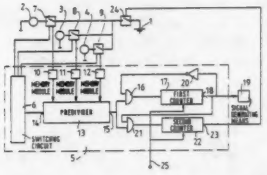
Claims priority, application Fed. Rep. of Germany, Jul. 7, 1988, 3823038

Int. Cl.[5] G08B *21/00*

U.S. Cl. 340—636 **4 Claims**

1. A method for monitoring the condition of charge of a battery for an appliance, said battery providing power to a plurality of electrical consumption means of the appliance, comprising the steps of: setting a first counter to an initial count condition which is representative of a fully charged condition of the battery; scanning at periodic intervals the plurality of electrical consumption means to determine if power is being supplied to each of the electrical consumption

means; changing the count condition of the first counter towards a final count condition in dependence upon the time each electrical consumption means is provided with electrical power and also in dependence upon the power consumption of each electrical consumption means; generating a signal upon reaching said final count condition of the first counter; activating a second counter upon reaching said final count condition



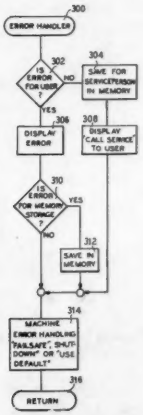
of the first counter; changing the count condition of the second counter from an initial count condition towards a final count condition in dependence upon the time each electrical consumption means is provided with electrical power and also in dependence upon the power consumption of each electrical consumption means; and switching off the appliance powered by said battery upon said second counter reaching its final count condition.

4,977,394

DIAGNOSTIC SYSTEM FOR AN AUTOMATIC APPLIANCE

Larry J. Manson, Baroda Township, and Michael D. Goslee, St. Joseph Township, both of Mich., assignors to Whirlpool Corporation, Benton Harbor, Mich.

Filed Nov. 6, 1989, Ser. No. 432,202
Int. Cl.[5] G08B *21/00*
U.S. Cl. 340—679 **12 Claims**



1. A method of operation of an automatic appliance including diagnosing operational errors comprising the steps of:

(a) sensing the occurrence of an operational error;

(b) identifying the type of error to a user, a first type of error being errors about which servicing should be requested to correct the error, a second type of error being errors about which servicing need not be requested to correct the error;

(c) alerting the user to request servicing if the error is of the first type;

(d) displaying information identifying the error to the user if the error is of the second type; and

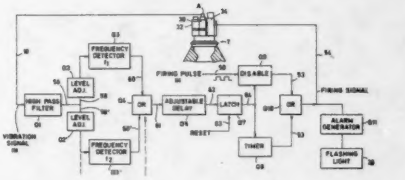
(e) determining if information identifying the error is to be stored for later retrieval by service personnel if the error is of the second type.

4,977,395

VIBRATION ANALYZER

Richard J. Bozeman, Jr., Dickinson, Tex., assignor to The United States of America as represented by the Administrator of the National Aeronautics and Space Administration, Washington, D.C.

Filed Jan. 31, 1989, Ser. No. 304,154
Int. Cl.[5] G08B *21/00*
U.S. Cl. 340—683 **12 Claims**



6. Monitoring apparatus for detecting high magnitude vibration of a machine during its operation comprising,

accelerometer means for generating a vibration signal representative of multi-frequency vibrations of said machine during its operation,

analog circuit means responsive to said vibration signal for determining the presence of at least one machine vibration of a predetermined frequency, only when said vibration signal is greater than a predetermined magnitude and for producing a machine instability signal if such machine vibration is detected, and

additional circuit means responsive to said vibration signal for determining the presence of additional machine vibrations at each of additional predetermined frequencies only when said vibration signal is greater than predetermined magnitudes and for producing said machine instability signal if any one or more of said additional machine vibrations is detected.

4,977,396

MACHINING PARAMETER SELECTIVE SETTING DISPLAY APPARATUS FOR ELECTROEROSION MACHINES

Kiyoshi Inoue, Tokyo, and Akihiko Shimizu, Kanagawa, both of Japan, assignors to Inoue Japax Incorporated, Kawasakishi, Japan

Filed Jun. 6, 1983, Ser. No. 501,300
Claims priority, application Japan, Apr. 2, 1982, 57-53744
Int. Cl.[5] G09G *5/00*
U.S. Cl. 340—706 **2 Claims**

1. The combination of a machining parameter selective setting display apparatus with an electroerosion machine adapted to have its parameters set by the apparatus, said apparatus comprising:

a frame;

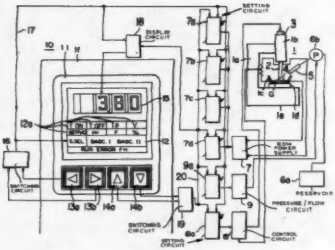
a parameter selection panel enclosed in said frame having segments representing different electroerosion machining parameters which are arranged in a predetermined array;

parameter selection switch means on said frame operatively associated with said segments on said panel and manually actuatable by an operator of the electroerosion machine for successive operator selection of said different machining parameters, said switch means being operable, upon the operator's each particular selection-related actuation thereof, to produce a switching signal to provide a visibly distinguishing presentation for the particular one of said

segments whose visibly distinguishing presentation represents the selected particular machining parameter;

a numeral display panel on said frame; and

a numeral selection switch means on said frame, operatively associated with said numeral display panel and manually actuatable by the operator for selection of a particular one of different numerical values in a predetermined set for each of said selected machining parameters, said numeral selection switch means being so coupled to said machine as to select particular machining parameters of electroerosion and being operable, upon the operator's actuation thereof related to selection of the particular numerical value for the particular selected machining parameter, to



provide a visual display of the selected particular numerical value on said numeral display panel, said parameter selection switch means comprising a pair of push-buttons associated with switching circuit means, the latter being operatively connected with said segments so as to shift said visually distinguishing presentation towards one of two opposite directions in which said segments are oriented in said array when one of said push-buttons is depressed, and to shift said visually distinguishing presentations towards the other of said two directions when the other of said push-buttons is depressed, said one of the push-buttons being provided with indicia representing said one and other directions, respectively.

4,977,397

TOUCH-CONTROL COMPUTER HOUSE

Wen-Chieh Kuo, Hsin Chu; Chia-Hui Lin, Taipei; Te-Chang Chou, Hsin Tien, and Yuan-Hsiung Liang, Taipei, all of Taiwan, assignors to Sysgration Ltd., Taiwan, Taiwan

Filed Oct. 13, 1989, Ser. No. 427,681

Int. Cl.[5] G09G 3/02

U.S. Cl. 340—710 7 Claims

1. A touch-control computer mouse, including:

an upper cover defining therein a touch-control space and comprising one set of press button slots;

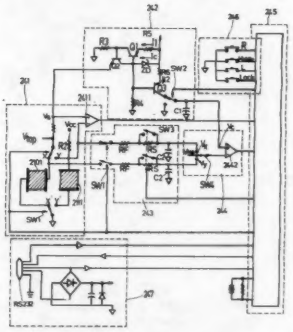
a casing comprising one of hanging slots for hanging of the casing and supporting stands internally disposed around an inner side wall;

a fastening element;

a laminated touch-control film assembly comprised, from the top to the bottom in proper sequence, of a plastic film face panel, a plate of silver coating, a y-axis resistance plane, a division layer, a x-axis resistance plane and an aluminum supporting board, said laminated touch-control film assembly being mounted on said supporting stands of said casing at the top and using a flexible ribbon line for signal output to a signal processing circuit;

a signal processing circuit board being internally mounted in said casing and comprising a contact detector circuit coupled to said flexible ribbon line of said laminated touch-control film assembly, a power saving type constant voltage supply and ramp generator coupled to said contact detector circuit for supplying a constant voltage to said contact detector circuit, a high-low speed averager coupled to an output of said contact detector circuit, a voltage reader coupled to an output of said high-low speed averager, a single-chip microprocessor coupled to an output of said voltage reader, and a function select switch set and series input-output and power circuit each coupled to said single-chip microprocessor;

wherein said upper cover is mounted on said casing to cover said signal processing circuit board and said laminated touch-control film assembly therein with said laminated touch-control film assembly disposed in said touch-control space of said upper cover;



characterized in that drawing on said laminated touch-control film assembly by a finger triggers to provide x-axis, y-axis reference potential to said contact detector circuit of said signal processing circuit board for processing, said signal processing circuit board further sending x-axis, y-axis coordinates corresponding to the contact signals detected and processed to a PC or communicating equipment for position display on the display screen of the monitor of the PC or communicating equipment such that computer mouse function can be achieved through said function select switch set.

4,977,398

COLOR TO MONOCHROME CONVERSION

Robert M. Pleva, Livermore, and Martin Randall, Santa Cruz, both of Calif., assignors to Chips and Technologies, Incorporated, San Jose, Calif.

Continuation of Ser. No. 144,849, Jan. 15, 1988, abandoned. This application Sep. 18, 1989, Ser. No. 409,269

Int. Cl.[5] G09G 5/00

U.S. Cl. 340—793 14 Claims

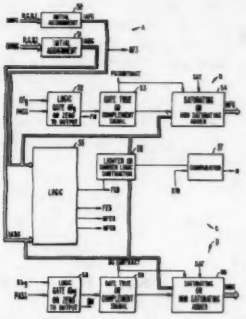
1. A contrast enhancing circuit for mapping color signals into signals for driving a display which is capable of displaying levels of gray comprising:

means for making an initial assignment of foreground and background colors to levels of gray;

means for determining if the separation between the foreground gray level and the background gray level produced by said initial assignment exceeds a predetermined separation threshold; and

means for increasing said separation when said threshold is not exceeded by said separation by modifying said initially

assigned levels of gray of said foreground and background colors without modifying levels of gray for alternate



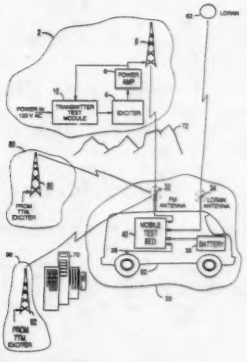
foreground and background colors which exceed said separation.

4,977,399

MOBILE RADIO PAGING TEST SYSTEM

Gary A. Price, Aloha; Daniel J. Park, Beaverton, and Mark R. Gehring, Portland, all of Oreg., assignors to AT&E Corporation, San Francisco, Calif.

Filed Aug. 9, 1988, Ser. No. 230,201
Int. Cl.[5] H04B 7/00
U.S. Cl. 340—825.440 10 Claims



1. In a paging system of the type having digital data modulated onto a radio signal to communicate a pager request, said radio signal transmitted from a radio station by a transmitter to a pager receiver located at a site remote from said station, a test system comprising:

a transmitter test module coupled to a radio transmitter at said station and a test bed located at said remote site,

said transmitter test module including:

a microprocessor for generating digital test data;

means coupled to said microprocessor for modulating said digital test data onto a radio signal and for injecting said modulated radio signal into said station transmitter;

said test bed including:

an antenna and a receiver for receiving said modulated ratio signal;

means coupled to said receiver for demodulating said modulated radio signal to recover said digital test data;

a computer coupled to said demodulator, said computer processing said recovered digital test data to generate paging test information; and

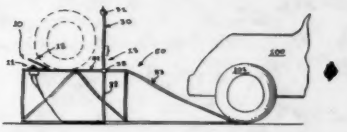
means for determining the latitude and longitude of said site to generate digital location data, said computer coupled to said means for determining location for processing said digital location data to generate said test information.

4,977,400

AUTO RAMP SAFETY SIGNAL

Harry Jeffries, 1858 103rd Ave., Coon Rapids, Minn. 55433

Filed Jul. 27, 1989, Ser. No. 385,618
Int. Cl.[5] G08B 5/36
U.S. Cl. 340—932.2 6 Claims



1. An add on signaling apparatus for wheel ramps having a horizontal top support surface and an upwardly inclined ramp surface wherein the horizontal top support surface is dimensioned to accommodate the wheel of a vehicle; and wherein the apparatus comprises:

a primary mounting unit for operatively engaging the apparatus with said ramp support surface including a power source member provided with: a push button to energize the power source member; a pair of electrical leads; and, a threaded nut and bolt arrangement;

a signal actuating unit comprising an elongated pressure plate member operatively associated with said ramp support surface and extending substantially across the width of said ramp support surface wherein said pressure plate member is operatively associated with said push button to energize the power source member upon contact of a vehicle wheel with the pressure plate member; and,

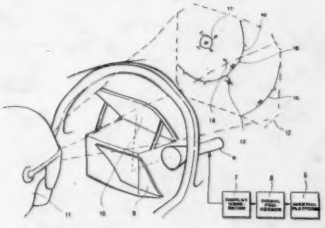
a signal unit including an elevated source of illumination electrically connected to said power source member.

4,977,401

HEAD-UP DISPLAY

Bengt E. Sjöberg, Linköping, Sweden, assignor to Saab-Scania Aktiebolag, Linkoping, Sweden

Filed Sep. 7, 1989, Ser. No. 403,285
Claims priority, application Sweden, Sep. 7, 1988, 8803134
Int. Cl.[5] G01C 23/00
U.S. Cl. 340—975 5 Claims



1. A head-up-display for indicating the attitude and flight-path angle vertically, the attitude in roll and the heading attitude of an air vehicle, the vehicle having means (5,6) for determining said attitudes and flight-path angle and for emitting corresponding first signals, the head-up-display comprising a screen (10) and means (7,8) for translating said signals to a

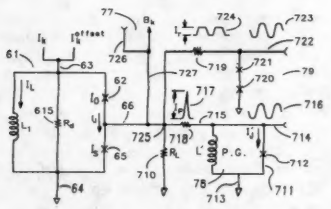
corresponding display, which is projected together with at least one symbol (13) of a velocity vector of the vehicle, and a symbol (14) of the x-axis of the vehicle, on the screen, said screen comprising a transparent but reflecting plate for the indicator display and said symbols, characterized in that the head-up-display is arranged to present the display (12) as a depiction of at least a portion of the inside of a space-stable sphere with its center in said vehicle, the display depicting at least portions of latitude circles, (15, 16, 19, 20), the nadir of the circles increasing the further away a circle is from the zenith or nadir of the sphere, and meridian markings (18) adjacent said circles.

4,977,402

NONHYSTERETIC PERIODIC-THRESHOLD SQUID COMPARATOR AND A/D CONVERTER

Herbert Ko, Mountain View, Calif., assignor to Hewlett-Packard Company, Palo Alto, Calif.

Filed Oct. 24, 1988, Ser. No. 261,813
Int. Cl.[5] H03M 1/00; G01R 33/035
U.S. Cl. 341—133 15 Claims



1. An analog to digital converter comprising:

a SQUID having: a first Josephson junction, a second Josephson junction, a clocked bias input, an input for input of an analog signal I_a under test, and a current return path; and

state sensing means for producing a binary output signal B indicative of whether said second junction is in a resistive state or a superconducting state;

said SQUID having in series, in the following order, said input, said first Josephson junction (62), said clocked bias input, said second Josephson junction and then said current return path;

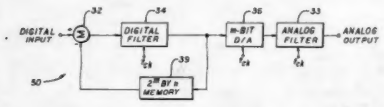
said first and second Josephson junctions characterized, respectively, by critical currents I_o and I_s selected such that a junction current I_J passing in series through said Josephson junctions exhibits no hysteresis for an analog signal having a frequency of substantially zero.

4,977,403

DIGITAL CORRECTION CIRCUIT FOR DATA CONVERTERS

Lawrence E. Larson, Santa Monica, Calif., assignor to Hughes Aircraft Company, Los Angeles, Calif.

Filed Jul. 29, 1988, Ser. No. 226,108
Int. Cl.[5] H03M 3/02, 1/06
U.S. Cl. 341—143 17 Claims



11. An improved analog-to-digital converter comprising:

first subtractor means for subtracting an analog error signal from the analog input to said improved analog-to-digital converter;

analog filter means for filtering the output of said first subtractor means;

digital converter means for converting the output of said analog filter into a digital signal;

first digital filter means for filtering said digital signal to provide a filtered digital signal as the output of the improved analog-to-digital converter; and

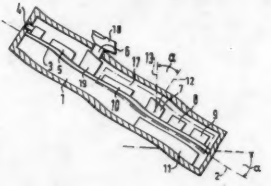
an improved digital-to-analog converter which receives said digital signal as an input and provides said analog error signal as an output.

4,977,404

REMOTE CONTROL TRANSMITTER FOR EMITTING CONTROL COMMANDS

Klaus Durst, Bruchsal, and Gerd Reime, Wurmberg, both of Fed. Rep. of Germany, assignors to Nokia Unterhaltungselektronik, Pforzheim, Fed. Rep. of Germany

Filed Nov. 28, 1989, Ser. No. 442,127
Int. Cl.[5] G08C 19/12; H01H 35/02
U.S. Cl. 341—176 20 Claims



1. Remote control transmitter, whose transmitter housing contains transmitter elements for emitting control commands selected at an entry device of the transmitter, by means of transmission signals formed in a signal converter of the transmitter, the distinguishing feature being that the device is a positional-deviation sensing means (17) coupled to the transmitter housing (1), which in the event of an angular position deviation (a) of the transmitter housing from a certain instantaneous reference position of the transmitter housing to a predetermined angle (a_o), generates an output signal designating the direction of angular position deviation as a control command capable of being passed to the signal converter (5).

4,977,405

PROGRAMMABLE IF CLUTTER CANCELLER

Carl E. Nothnick, Pasadena, Md., assignor to Westinghouse Electric Corp., Pittsburgh, Pa.

Filed Jan. 25, 1990, Ser. No. 469,971
Int. Cl.[5] G01S 13/538
U.S. Cl. 342—162 9 Claims

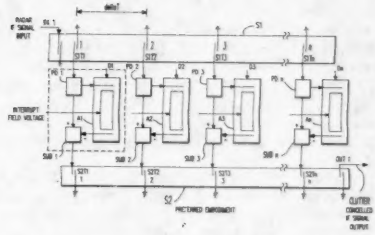
9. A method of cancelling clutter in an input signal comprising the steps of:

time-demultiplexing said input signal into two or more derivative signals with a surface acoustic wave device such that said derivative signals are delayed differing amounts with respect to said input signal;

storing each of said derivative signals with an acoustic charge transport device;

subtracting each of said derivative signals from the previously stored portion of said particular derivative signal

such that two time slices of each of said derivative signals are subtracted from each other; and



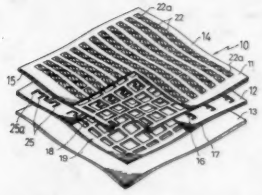
time-multiplexing said subtracted derivative signals with a surface acoustic wave device to form a single output signal.

4,977,406

PLANAR ANTENNA

Katsuya Tsukamoto, and Toshio Abiko, both of Osaka, Japan, assignors to Matsushita Electric Works, Ltd., Osaka, Japan

Filed Dec. 9, 1988, Ser. No. 282,069
Claims priority, application Japan, Dec. 15, 1987, 62-316684
Int. Cl.[5] H01Q 1/38
U.S. Cl. 343—700 MS 2 Claims



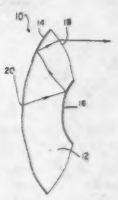
1. A planar antenna for receiving polarized waves of a wavelength λg transmitted as carried on SHF band from a satellite, the antenna comprising a power-supply circuit pattern including power-supply terminals and additional power-supply terminals respectively formed by a conductive material, said additional power-supply terminals are provided as optional power-supply terminals connected as extensions of said power-supply terminals and have a mutual phase difference of an integer multiple of wavelength λg, a radiation circuit pattern including radiation elements and additional radiation elements respectively formed by a conductive material, said radiation elements corresponding respectively to each of said power-supply terminals and said additional radiation elements corresponding respectively to each of said additional power-supply terminals, and a ground conductor layer disposed with respect to said power-supply circuit pattern and radiation circuit pattern with a dielectric layer interposed between the power-supply circuit pattern and the ground conductor layer wherein a further dielectric layer is interposed between said power-supply circuit pattern and said radiation circuit pattern, whereby said power-supply and radiation circuit patterns and said ground conductor layer form a mutually spaced parallel relationship.

4,977,407

OPTICAL COLLIMATOR

Patrick E. Crane, 8405-A Benjamin Rd., Tampa, Fla. 33634

Continuation-in-part of Ser. No. 286,231, Jul. 23, 1981. This application Nov. 27, 1985, Ser. No. 802,239
Int. Cl.[5] H01Q 19/06
U.S. Cl. 343—753 28 Claims



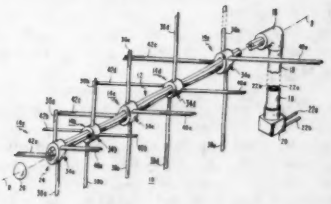
1. Antenna apparatus comprising a one-part, biconvex dielectric lens antenna having at least one curved reflective surface provided with reflective media and having at least one refractive surface and having a feed point positioned on the lens opposite one reflective surface.

4,977,408

DEPLOYABLE ANTENNA BAY

Jack D. Harper, West Windsor Township, Mercer County; Richard W. Clayton, Medford, both of N.J., and Philip Olikara, Lower Makefield Township, Bucks County, Pa., assignors to General Electric Company, East Windsor, N.J.

Filed Jun. 28, 1989, Ser. No. 372,747
Int. Cl.[5] H01Q 1/12, 11/10
U.S. Cl. 343—792.5 17 Claims



1. A deployable antenna apparatus comprising:

an elongated electrically conductive first spring-like tape element defining an axis of elongation and forming at least a part of the antenna;

a generally cylindrical support structure defining a cylinder and having a cylinder axis and a support surface;

mechanical coupling means for coupling a first end of said element to a first location on said cylinder, with said axis of elongation lying in a plane perpendicular to said cylinder axis;

a feed conductor coupled to said element near said first end;

a retainer including first and second generally annular sides spaced apart by a circumferential band, said first and second annular sides each defining a central aperture bearing against said support surface and rotatable relative thereto, said circumferential band having a first orifice larger than the cross-section of said element, said element extending through said first orifice, whereby rotation of said retainer relative to said support structure causes said element to wind about said support structure, and the energy stored in said element by said rotation provides for deployment, said circumferential band further having;

a second orifice, said second orifice being diametrically opposed to said first orifice relative to said cylinder axis;

an elongated, electrically conductive second element substantially like said first element, said second element extending through said second orifice and having a first end mechanically coupled to said support surface at a second location diametrically opposite to said first location relative to said cylinder axis; and

a second feed conductor coupled to said second element near said first end of said second element.

4,977,409

RECORDER WITH AUTOMATIC SCALE RECORDING DEVICE

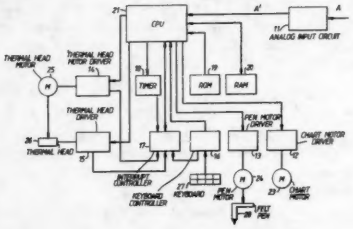
Yasuyuki Kanda, Tokyo, Japan, assignor to Kabushiki Kaisha Toshiba, Kanagawa, Japan

Filed Feb. 9, 1989, Ser. No. 308,069

Claims priority, application Japan, Feb. 10, 1988, 63-29264

Int. Cl.[5] G01D *9/00*

U.S. Cl. 346—23 **6 Claims**



1. A recorder for recording analog input data and scale patterns onto recording paper, said recorder comprising:

waveform processing means for receiving and buffering the analog input data;

input means for receiving a scale maximum value and a scale minimum value of graduation lines to be recorded on said paper;

main control means, coupled to said input means and to said waveform processing means, for automatically calculating positions of graduation lines on said paper according to said scale maximum value and said scale minimum value;

recording means, coupled to said main control means, for recording onto said paper a waveform corresponding to said analog input data and graduation lines at the positions calculated by the main control means.

4,977,410

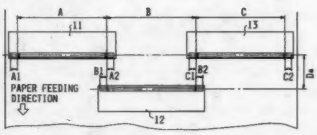
THERMAL LINE PRINTER WITH STAGGERED HEAD SEGMENTS AND OVERLAP COMPENSATION

Hideki Onuki, and Masaki Denda, both of Tokyo, Japan, assignors to Seiko Instruments Inc., Japan

Filed Sep. 14, 1989, Ser. No. 407,407

Int. Cl.[5] G01D *15/10*; B41J *2/345, 2/355*

U.S. Cl. 346—76 PH **10 Claims**



1. A thermal line printer for line-sequentially printing dots on a recording medium in horizontal and vertical directions according to bit data, comprising:

a line thermal head including a plurality of linear head segments arranged in a pair of parallel rows along the horizontal direction in staggered relation to each other such that the head segments partly overlap through different relative displacements with each other between the rows, each of the head segments having a plurality of heating elements disposed linearly along the segment, the heating elements being effective to print dots according to image bit data and being ineffective to print dots according to blank bit data;

feeding means for line-sequentially feeding a recording medium relative to the line thermal head in the vertical direction;

designating means operative according to the different relative displacements for designating effective and ineffective sections adjacently with each other to the respective head segments such that the designated effective sections are successively connected to each other in the horizontal direction without irregular overlapping and spacing, the designating means including input means for manually inputting command data representative of actual relative displacements between the staggered head segments, and shifting means for shifting the designation of the effective and ineffective sections so as to adjust for the actual relative displacements; and

assigning means operative during each line-sequential printing for assigning image bit data to heating elements within the effective sections and blank bit data to heating elements within the ineffective sections to thereby effect regular dot printing along each line.

4,977,411

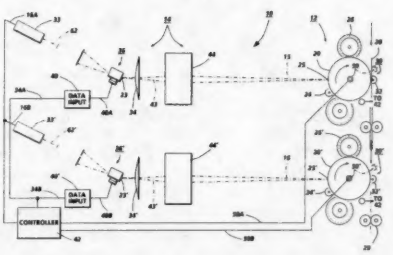
ELECTRONIC COLOR PRINTING SYSTEM

Martin J. Pepe, West Henrietta, N.Y., assignor to Xerox Corporation, Stamford, Conn.

Filed Nov. 6, 1989, Ser. No. 432,012

Int. Cl.[5] G01D *15/16*; H04N *1/46*

U.S. Cl. 346—108 **4 Claims**



1. A printer comprising an image writing section for forming line images on the surface of a photosensitive medium located in a xerographic processing section, the image writing section including at least one light source for emitting beams of output radiation of a first duration upon application of a strobe pulse thereto; modulator means in the path of said output radiation for directing a modulated light beam signal to said photoreceptor medium; means for applying data signals to said modulator, the application of said data signals being separated by a time period of a second duration, said radiation output of first duration being narrow in width compared to the time period of said second duration, and control means for controlling the application of said strobe pulses to said light source, the application occurring during said second time duration.

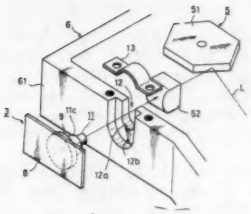
4,977,412

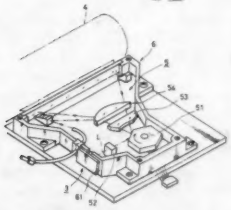
OPTICAL SCANNING DEVICE

Shin Komori, Yokohama; Jun Azauma, Tokyo, and Yoshiaki Watanabe, Yokohama, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Filed Dec. 20, 1988, Ser. No. 286,841
Claims priority, application Japan, Dec. 21, 1987, 62-323291
Int. Cl.[5] G01D *15/16*
U.S. Cl. 346—108 13 Claims

1. An optical scanning device comprising:
a beam source unit having a laser source; and
a housing on which said beam source unit is mounted, said housing accommodating optical components for enabling a laser beam from said beam source unit to scan the surface of a scanned object;





said housing including a base plate carrying said optical components and a side wall provided with a beam source mounting portion to which said beam source unit is detachably mounted by a vertical movement of said beam unit;
said beam source unit being located vertically when mounted in said side wall.

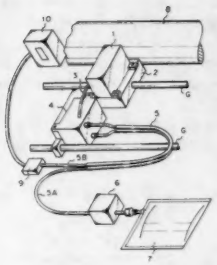
4,977,413

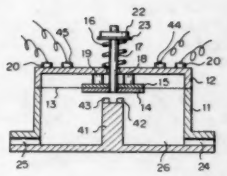
INK REMAIN DETECTOR HAVING A FLEXIBLE MEMBER AND A LIQUID INJECTION RECORDING APPARATUS UTILIZING THE DETECTOR

Akihiro Yamanaka, Hiratsuka; Hiroshi Iida, Machida, and Minoru Nozawa, Atsugi, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 179,867, Apr. 11, 1988, abandoned.
This application Oct. 19, 1989, Ser. No. 423,746
Claims priority, application Japan, Apr. 15, 1987, 62-92823; Apr. 15, 1987, 62-92824
Int. Cl.[5] B41J *2/17*
U.S. Cl. 346—140 R 21 Claims

1. A liquid injection recording apparatus comprising:
a recording head for injecting ink toward a recording medium to thereby effect recording;
an ink tank storing therein the ink to be supplied to said recording head;
supply path means for supplying ink between said ink tank and said recording head; and
an ink remain detector provided in said supply path and including an inflow port into which ink flows, an outflow port from which ink flows out, an ink chamber communicating with said inflow port and said outflow port, a flexible film member which comprises at least a portion of a wall forming said ink chamber, and a plurality of detector means each having an electrically conductive member provided on said film member and an electrode provided





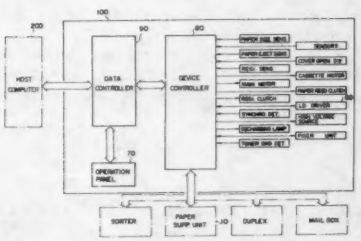
correspondingly to said electrically conductive member and being fixed to said detector.

4,977,414

IMAGE FORMING APPARATUS

Kazuyuki Shimada, Chofu; Yoshiharu Niito, Yokohama; Yikitoshi Kiya, Kawasaki; Takahiro Yagishita, Yokohama; Masayoshi Miyamoto, Yokohama; Hideo Azumai, Yokohama, and Keiichi Iwasaki, Suita, all of Japan, assignors to Ricoh Company, Ltd., Tokyo, Japan

Filed Oct. 20, 1989, Ser. No. 424,388
Claims priority, application Japan, Oct. 21, 1988, 63-265508
Int. Cl.[5] G01D *15/06*
U.S. Cl. 346—154 22 Claims



1. An image forming apparatus comprising:
a recording medium;
light source means for emitting a light beam;
optical scanning means, provided between said light source means and said recording means, for scanning said recording medium by deflecting said light beam emitted from said light source means to thereby form an image on said recording medium, said optical scanning means having

one of predetermined optical characteristics different from each other;

memory means for storing a plurality of sets of control data provided for said predetermined optical characteristics of said optical scanning means, said control data being used for controlling said light source means;

control data selecting means for selecting one of the sets of control data which relates to said one of the predetermined optical characteristics of said optical scanning means; and

control means for controlling said light source means on the basis of image data and said selected one of sets of control data.

4,977,415

ELECTROSTATIC RECORDING HEAD, IMAGE RECORDING APPARATUS, DEVELOPING AGENT SUPPLYING DEVICE, DISPLAY DEVICE AND METHOD OF PRODUCING ELECTROSTATIC RECORDING HEAD

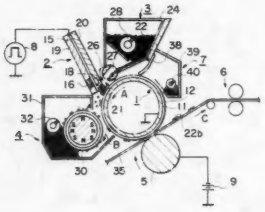
Sayoko Oba; Katsumi Muroi; Kenji Okuna; Hidefumi Ohtsuka, all of Ibaraki; Tsutomu Iimura, Tachikawa; Ryoji Kojima, Katsuta, and Keisuke Kurihara, Yokohama, all of Japan, assignors to Hitachi, Ltd.; Hitachi Koki Co., Ltd. and Hitachi Metals, Ltd., all of Tokyo, Japan

Filed Oct. 12, 1989, Ser. No. 420,480

Claims priority, application Japan, Oct. 17, 1988, 63-260739

Int. Cl.[5] G01D *15/00*

U.S. Cl. 346—155 **29 Claims**



1. An electrostatic recording head comprising:

a recording electrode having a plurality of linear electrodes arranged in a common plane at predetermined intervals;

a magnet disposed at one side of said recording electrode; and

a magnetic member disposed at a side of said recording electrode opposite to said magnet;

said magnet being disposed so that magnetic lines of force pass through an end of said recording electrode towards a portion of a recording member opposed by said end of said recording electrode.

4,977,416

INTEGRATED THICK FILM ELECTROSTATIC WRITING HEAD

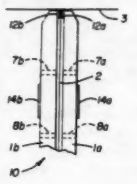
Andreas Bibl, Los Altos, and George Fellingham, San Jose, both of Calif., assignors to Rastergraphics, Inc., Sunnyvale, Calif.

Filed Sep. 21, 1989, Ser. No. 410,594

Int. Cl.[5] G01D *15/00*

U.S. Cl. 346—155 **10 Claims**

8. An improved electrographic writing head for placing electrostatic charges on a recording medium including a series of writing nib means formed on a substrate, each nib means for selectively placing an electrostatic charge on a recording medium in close proximity thereto upon application of a voltage; the improvement comprising a ground plane means disposed parallel to the plane of the writing nib means and at a



distance therefrom for controlling the effects of nib-to-nib parasitic capacitance.

4,977,417

ELECTROPHOTOGRAPHY SYSTEM

Itsuo Takanashi, Kamakura; Toshikatsu Ichitou, Kawasaki; Hiroki Kitamura, Tokyo; Takashi Yamamura, Yokohama; Koubun Sakagami, and Atsushi Nakano, both of Sagamihara, all of Japan, assignors to Victor Company of Japan, Ltd., Japan

Filed Dec. 14, 1989, Ser. No. 450,772

Int. Cl.[5] G01D *15/14;* **G03G** *15/01, 21/00*

U.S. Cl. 346—160 **8 Claims**

1. An electrophotography system comprising:

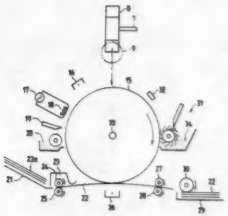
a rotatable drum arranged to be rotatable about its own axis in accordance with a drum-drive signal and having on its circumferential surface a photosensitive member for holding an electrostatic latent image, said photosensitive member being arranged to take a first absorption spectrum state and a second absorption spectrum state, and the variation from said first absorption spectrum state to said second absorption spectrum state being made by illuminating said photosensitive member with light whose intensity is above a predetermined threshold and whose wavelength is in a first predetermined wavelength region;

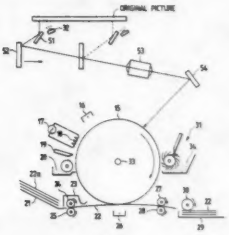
an optical system including light source means for illumination of said photosensitive member so as to form an electrostatic latent image on said photosensitive member, said optical system being arranged to directly illuminate said photosensitive member by light from said light source means and further to illuminate said photosensitive member by reflected light from an original picture due to said light source means, said light source means being arranged to emit light whose wavelength is in said first predetermined wavelength region and further emit light whose wavelength is in a second predetermined wavelength region, the intensity of the light emitted from said light source means being controllable in intensity in accordance with an information signal;

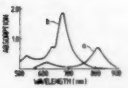
electrifier means for charging said photosensitive member in response to an electrifier-drive signal; and

control means for generating said drum-drive signal, said information signal and said electrifier-drive signal to control the rotation of said rotatable drum, said optical system and said electrifier means so as to form an electrostatic latent image on said photosensitive member by selectively performing a laser-printing mode, a printing mode, a first copying mode and a second copying mode, said laser printing mode being effected by evenly charging said photosensitive member, taking said first absorption spectrum state, by means of said electrifier means before illuminating said photosensitive member with light from said light source means whose intensity is below said predetermined threshold and whose wavelength is in said first predetermined wavelength region, said printing mode being effected by illuminating said photosensitive member, taking said first absorption spectrum state, with light from said light source means, whose intensity is above said predetermined threshold and whose wavelength is in said

first predetermined wavelength region, so that said photosensitive member partially takes said second absorption spectrum state in correspondence with said information signal and evenly charging said photosensitive member by said electrifier means before illuminating the whole surface of said photosensitive member with light which has a wavelength in said second predetermined wavelength region, said first copying mode being effected by charging said photosensitive member, taking said first absorption spectrum state, by means of said electrifier means and then illuminating said photosensitive member with reflected light from the original picture which has an intensity







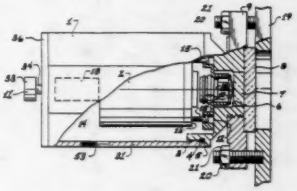
below said predetermined threshold and which has a wavelength in said first predetermined wavelength region, and second copying mode being effected by illuminating said photosensitive member with light from said light source means, whose intensity is above said predetermined threshold and whose wavelength is in said first predetermined wavelength region, so that said photosensitive member wholly takes said second absorption spectrum state and then charging said photosensitive member by said electrifier means before illuminating said photosensitive member with reflected light from the original picture which has an wavelength in said second predetermined wavelength region.

4,977,418

CAMERA VIEWING UNIT

Thomas M. Canty, 483 Fruitwood Terrace, Williamsville, N.Y. 14221

Filed Oct. 3, 1989, Ser. No. 416,705
Int. Cl.[5] G03B 37/00
U.S. Cl. 354—63 14 Claims



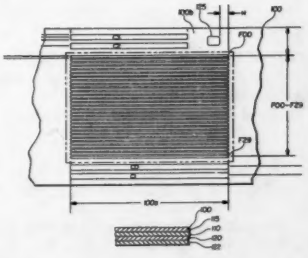
1. A camera viewing unit adapted to be connected to a vessel comprising a camera, a hermetically-sealed camera housing, a camera adjusting means and a camera focusing means, said camera housing containing internally therein said camera and having a front opening means permitting said camera to view out of an opening in a front viewing portion of said housing, a fixed lens mounted between a lens of said camera and the front viewing portion of said housing, said front opening in the viewing portion of said housing comprising an aperture having fused thereover a fused lens, said fused lens being optically clear and fused to said front viewing portion around said aperture, said camera adjusting means and said camera focusing means being located external of said housing.

4,977,419

SELF-CLOCKING ENCODING/DECODING FILM INFORMATION EXCHANGE SYSTEM USING DEDICATED MAGNETIC TRACKS ON FILM

Michael L. Wash, Pittsford, and Arthur A. Whitfield, Rochester, both of N.Y., assignors to Eastman Kodak Company, Rochester, N.Y.

Filed Oct. 7, 1988, Ser. No. 254,987
Int. Cl.[5] G03B 17/24, 27/52, 29/00
U.S. Cl. 354—76 6 Claims



1. In an elongate photographic film strip susceptible of exposure of successive frames thereof in a camera having a magnetic reading or writing system and adapted for printing by a photofinishing device having a magnetic reading or writing system, the improvement comprising:

a virtually transparent magnetic layer; and

longitudinal parallel tracks magnetically recorded in said magnetic layer, said tracks comprising self-clocking three-part encoded data, each of said tracks beginning and

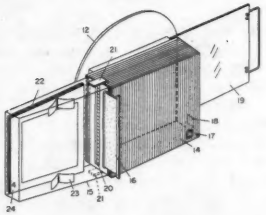
ending within a particular frame, and each of said tracks further comprising first and second three-part encoded binary characters uniquely representing start and stop sentinels respectively, whereby said film strip may be transported at different velocities with respect to the magnetic reading or writing means in said camera and in said photofinishing device and whereby the direction of film strip transport can be automatically detected through said start and stop sentinels.

4,977,420

CAMERA WITH DEVELOPMENT FUNCTION

Yoshikazu Sano, Osaka, Japan, assignor to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

Filed Mar. 17, 1989, Ser. No. 326,040
Claims priority, application Japan, Mar. 24, 1988, 63-70025
Int. Cl.[5] G03B *17/50*
U.S. Cl. 354—79 **24 Claims**



1. A camera attachment for receiving an exposed photographic film dispensed from a film outlet of a self-developing camera, said camera attachment comprising:

a compartment casing having an opening;

attaching means for detachably mounting said compartment casing to the self-developing camera so as to enclose the film outlet of the self-developing camera, said opening of said compartment casing being positioned upon mounting of said compartment casing to the self-developing camera so as to receive the exposed photographic film dispensed from the film outlet within said compartment casing; and,

an opening cover for closing said opening of said compartment casing so as to seal the exposed photographic film within said compartment casing prior to and subsequent to detachment of said compartment casing from the self-developing camera.

4,977,421

DOUBLE LIGHT BLOCKING SHUTTER

Tsuyoshi Fukuda, Kanagawa, Japan, assignor to Canon Kabushiki Kaisha, Tokyo, Japan

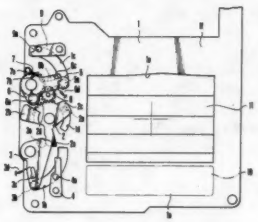
Filed Sep. 26, 1989, Ser. No. 412,332
Int. Cl.[5] G03B *9/40*
U.S. Cl. 354—246 **15 Claims**

1. A shutter having a leading blade group drive member for driving a leading blade group and a trailing blade group drive member for driving a trailing blade group, comprising:

(a) a trailing blade group force accumulating member, engaged with the trailing blade group drive member, for pushing the trailing blade group drive member in a shutter running direction, said trailing blade group force accumulating member being movably supported;

(b) a charge member, engaged with said trailing blade group force accumulating member, for moving said trailing blade group force accumulating member from a running completion position to a running preparation position; and

(c) a drive mechanism, engaged with the trailing blade group drive member and with said charge member, for moving the trailing blade group drive member, in response to movement of said charge member, to one of a double light-blocking state where an aperture of the shutter is covered by both of the leading blade group and the trailing blade group, and a double light-blocking cancelling state where the aperture is covered by only the leading blade group.

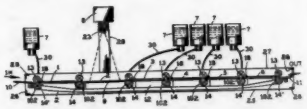


4,977,422

APPARATUS FOR TRANSPORTING FLAT SHEETS, ESPECIALLY PHOTOSENSITIVE SHEET MATERIALS

Quentin D. Vaughan, IV, Davie, Fla., assignor to Visicon, Inc., Powell, Tenn.

Division of Ser. No. 117,902, Oct. 29, 1987, Pat. No. 4,845,019, which is a division of Ser. No. 871,813, Jun. 6, 1986, abandoned.
This application Mar. 28, 1989, Ser. No. 329,818
Int. Cl.[5] G03D *5/00*
U.S. Cl. 354—317 **5 Claims**



1. Apparatus for transporting a flat sheet between first and second locations comprising a continuous loop belt having a smooth surface facing outwardly of such loop, a source of liquid, means for directing liquid from said source onto said smooth surface of said belt to substantially coat said surface of said belt with a layer of said liquid at a location on said surface ahead of and prior to the disposition of said flat sheet onto said surface of said belt, means for positioning said sheet onto said liquid-bearing surface of said belt, means for urging said sheet into intimate contact with said surface of said belt and substantially simultaneously expelling all but a thin layer of said liquid from between said sheet and said surface of said belt whereby there is developed a surface-tension bond between said sheet and said belt, and means for moving said belt with said sheet thereon in a forward direction.

4,977,423

EXPOSURE CALCULATING APPARATUS

Yasuteru Yamano; Takehiro Katoh; Akihiko Fujino; Kenji Tsuji; Shuji Izumi; Masaaki Nakai, and Nobuyuki Taniguchi, all of Osaka, Japan, assignors to Minolta Camera Kabushiki Kaisha, Osaka, Japan

Continuation of Ser. No. 307,845, Feb. 8, 1989, abandoned. This application Dec. 20, 1989, Ser. No. 453,259
Claims priority, application Japan, Feb. 8, 1988, 63-28512; Feb. 8, 1988, 63-28513; Feb. 8, 1988, 63-28514; Feb. 27, 1988, 63-45558; Mar. 16, 1988, 63-64408
Int. Cl.[5] G03B *13/36*
U.S. Cl. 354—402 **10 Claims**

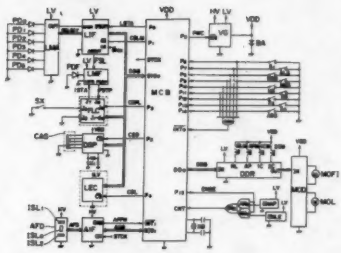
1. An exposure calculation apparatus comprising:

plural first means for measuring light incident on a plurality

of regions of a photographing image plane and outputting data of the measured light;

plural second means for detecting the focusing conditions of objects present in a plurality of the regions of the photographing image plane and outputting data on the focusing conditions;

third means for detecting the position which a main object occupies in the photographing image plane depending on



the data on the focusing conditions outputted from said second means;

fourth means for making a plurality of calculations, each of which is made depending on at least one of the data of measured light outputted from said plural first means; and

fifth means for selecting one of the plurality of calculations depending on the position detected by the third means and the data on the focusing conditions of the position.

4,977,424

LIGHT MEASURING DEVICE FOR CAMERA

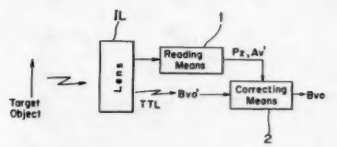
Hiromu Mukai; Toshihiko Karasaki, and Kohtaro Hayashi, all of Osaka, Japan, assignors to Minolta Camera Kabushiki Kaisha, Osaka, Japan

Filed Oct. 13, 1988, Ser. No. 257,204

Claims priority, application Japan, Oct. 14, 1987, 62-258596; Oct. 14, 1987, 62-258597; Oct. 23, 1987, 62-268832

Int. Cl.[5] G03B *7/08, 7/099*

U.S. Cl. 354—410 **12 Claims**



1. A light measuring device for a full-aperture metering, lens-interchangeable photographic camera of a type capable of measuring the brightness of a target object to be photographed through a photo-taking lens assembly for the determination of an exposure amount, said device comprising:

means for receiving incident light arranged in a position deviated from an optical axis of the photo-taking lens;

a reading means for reading, from an interchangeable lens assembly, data associated with an exit pupil of the interchangeable lens assembly and data associated with the full aperture value of the interchangeable lens assembly; and

a correcting means for calculating a correction value for a measured light value on the basis of the data read out by the reading means, for the purpose of exposure correction, said correction value being calculated such that the correction value varies over a relatively large range in response to a variation of the data associated with the exit pupil when the full aperture value represented in F number of the interchangeable lens assembly is large, and the correction value varies over a relatively small range in response to a variation of the data associated with the exit pupil when the full aperture value represented in F number of the interchangeable lens assembly is small.

4,977,425

INDICATING APPARATUS WITHIN FINDER OF CAMERA

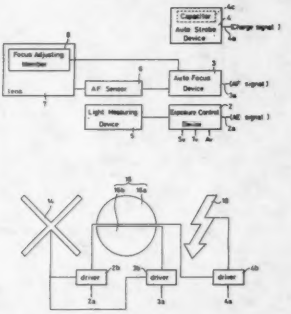
Masato Yamamoto; Toshimasa Yamanaka, and Masahiro Nakajima, all of Tokyo, Japan, assignors to Asahi Kogaku Kogyo Kabushiki Kaisha, Tokyo, Japan

Filed Dec. 21, 1988, Ser. No. 287,135

Claims priority, application Japan, Dec. 25, 1987, 62-196988[U]

Int. Cl.[5] G03B *17/18*

U.S. Cl. 354—474 **11 Claims**



1. An apparatus for indicating photographic conditions, said apparatus comprising at least one indicator symbol formed as a composite of a plurality of individually controllable indicating symbols, said indicator symbol representing a single symbol or figure as a whole in a field of view, said photographic conditions being indicated by said indicator symbol, wherein said indicator symbol has a substantially x-shaped configuration which is divided into a plurality of parts.

4,977,426

PROJECTION EXPOSURE APPARATUS

Ryusho Hirose, Kawasaki, Japan, assignor to Canon Kabushiki Kaisha, Tokyo, Japan

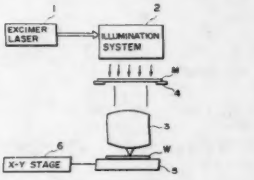
Continuation of Ser. No. 6,567, Jan. 23, 1987, abandoned, which is a continuation of Ser. No. 682,232, Dec. 17, 1984, abandoned.

This application Jun. 24, 1988, Ser. No. 212,148

Claims priority, application Japan, Dec. 28, 1983, 58-245904; Jul. 9, 1984, 59-142059; Jul. 9, 1984, 59-142060; Nov. 28, 1984, 59-252277

Int. Cl.[5] G03B *27/42, 27/54*

U.S. Cl. 355—53 **4 Claims**



1. A projection exposure apparatus, comprising:

a light source device providing a band-narrowed excimer laser beam;

a projection lens system for projecting a pattern of an original on a wafer, said projection lens system including a plurality of non-cemented lens elements made of different materials having sufficient transmissibility with respect to the excimer laser beam; and

means for supporting the original and the wafer so that the pattern of the original can be projected on the wafer by said projection lens system with the excimer laser beam.

4,977,428

SYSTEM FOR DRIVE CONTROL OF TONER AGITATOR IN IMAGE-FORMING APPARATUS

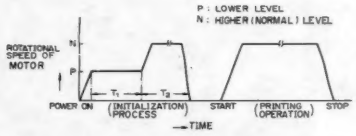
Shigeki Sakakura, Tama, and Nobuyuki Hayashida, Hachiouji, both of Japan, assignors to Fujitsu Limited, Kawasaki, Japan

Filed May 24, 1989, Ser. No. 356,450

Claims priority, application Japan, May 25, 1988, 63-129365

Int. Cl.[5] G03G *15/06*

U.S. Cl. 355—245 **10 Claims**



1. An image-forming apparatus comprising:

an endless image-carrying body;

means for forming a latent image on said image-carrying body;

a vessel, detachably mounted to said image-forming apparatus, for accommodating a powdery toner therein;

means for developing the latent image formed on said image-carrying body with the powdery toner delivered from said vessel;

an agitator for stirring the toner in said vessel while driven at a first speed during a normal developing step;

means for driving said agitator; and

means for controlling said driving means to be driven at a second speed slower than the first speed during an initialization process of said apparatus.

4,977,429

APPARATUS FOR SUPPLYING TONER TO AN IMAGE FORMING APPARATUS

Tatsuo Tani, Urayasu, and Mutsuo Watanabe, Yokohama, both of Japan, assignors to Ricoh Company, Ltd., Tokyo, Japan

Filed Nov. 1, 1989, Ser. No. 430,576

Claims priority, application Japan, Nov. 8, 1988, 63-280528

Int. Cl.[5] G03G *15/06, 21/00*

U.S. Cl. 355—260 **4 Claims**

1. An image forming apparatus for developing a latent image electrostatically formed on an image carrier by a developer in the form of a toner to produce a toner image, comprising:

a developing device loaded with a removable toner cartridge containing a toner therein and supplied with said toner from said toner cartridge, the toner cartridge comprising:

a body; and

a shutter openably mounted on an opening which is formed through said body;

said shutter being opened to supply the toner into said developing device when a new toner cartridge is loaded in said developing device;

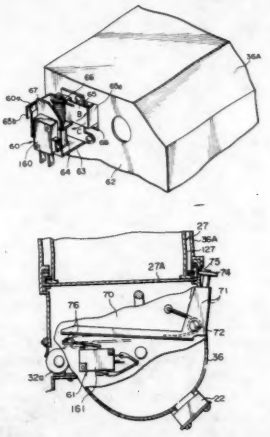
a shutter sensor responsive to opening of said shutter;

a sensing device responsive to a condition wherein the toner should be supplied to said developing device and to execution of consecutive manipulations for toner supply, said sensing device comprising:

a toner shortage sensor for sensing shortage of toner in said developing device; and

a cartridge sensor for sensing the toner cartridge being loaded;

a controller for controlling said display such that when said toner shortage sensor has sensed a shortage of toner and said cartridge sensor has sensed presence of the toner cartridge, a message for urging one to supply the toner to



said developing device by replacing said toner cartridge appears while, when said toner shortage sensor has sensed a shortage of toner and said cartridge sensor has sensed an absence of said toner cartridge, a message for urging one to insert a new toner cartridge appears; and

a display for displaying, in response to an output signal of said sensing device, a kind of manipulation to be executed next.

4,977,430

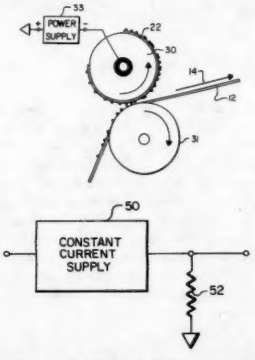
TRANSFER ROLLER POWER SUPPLY

Christopher J. Florack, Rochester, and William Y. Fowlkes, Brockport, both of N.Y., assignors to Eastman Kodak Company, Rochester, N.Y.

Filed Jun. 24, 1988, Ser. No. 211,001

Int. Cl.[5] G03G *15/16*

U.S. Cl. 355—274 **2 Claims**



1. Apparatus for determining the bias voltage for a transfer member in an electrostatographic marking engine, said apparatus comprising:

a constant current power supply having an output terminal and a fixed output between the range of 60 and 100 microamps;

means for electrically connecting the output terminal of the constant current power supply to the transfer member; and

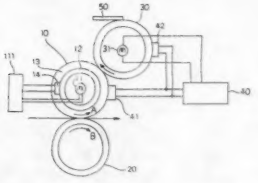
a resistance element connected in parallel with the transfer member for reducing the amount of the constant current from the power supply which is applied to the transfer member.

4,977,431

FIXING APPARATUS AND METHOD OF CONTROLLING TEMPERATURE OF THE SAME

Kazuo Fuji, Higashiosaka, Japan, assignor to Mita Industrial Co., Ltd., Osaka, Japan

Filed Oct. 17, 1988, Ser. No. 258,585
Claims priority, application Japan, Oct. 26, 1987, 62-270969
Int. Cl.[5] G03G *15/20*
U.S. Cl. 355—289 **5 Claims**



1. A fixing apparatus having a heat roller incorporating a heater, a press roller press-contacting said heat roller, and an external heating apparatus for heating said heat roller, said apparatus comprising:

a first detecting means for detecting a surface temperature of said heat roller,

a second detecting means for detecting a temperature of said external heating apparatus, and

a control part which receives results of detection by said first detecting means and second detecting means and controls said external heating apparatus, said control part comprising a bridge circuit including a parallel resistance circuit formed by said first detecting means and said second detecting means, said bridge circuit providing an output which depends upon variations in a combined resistance of said first and second detecting means in said parallel circuit, a comparator for comparing an output of said bridge circuit with a reference voltage, and an on-off means for turning said external heating apparatus on or off according to an output from said comparator.

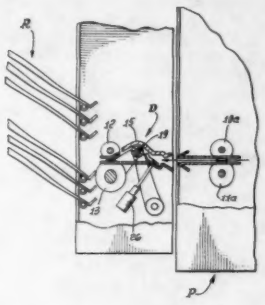
4,977,432

DECURLING AND OFFSETTING DEVICE

Peter M. Coombs, Tustin, and Hans Graafmans, Huntington Beach, both of Calif., assignors to Gradco Systems, Inc., Irvine, Calif.

Filed Jul. 13, 1988, Ser. No. 218,396
Int. Cl.[5] G03G *15/00*; B65H *29/00*
U.S. Cl. 355—309 **1 Claim**

1. A device for removing curl from paper exiting a copier, printer or facsimile machine comprising: means for decurling sheets including a rotary driven paper feed shaft having a paper drive roll thereon and an arched guide member extending partially about said drive roll in closely spaced relation to the outer periphery of said drive roll and forming an arcuate gap exceeding the thickness of the paper to longitudinally deform the sheet between said roll and said guide and causing drive friction between said roll and the paper, means for rotating said shaft, and means for selectively laterally offsetting paper driven through the device by said shaft including means



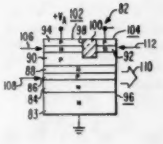
for shifting said shaft between selected longitudinally offset positions.

4,977,433

OPTOELECTRONIC SEMICONDUCTOR DEVICE

Jacques I. Pankove, Boulder, Colo., assignor to University of Colorado Foundation, Inc., Boulder, Colo.

Filed Oct. 27, 1989, Ser. No. 428,388
Int. Cl.[5] H01L *29/205, 31/06*
U.S. Cl. 357—16 **14 Claims**



1. An optoelectronic semiconductor device comprising:

a semiconductor device capable of generating and emitting light when a light beam is directed therein and a voltage above a threshold is applied thereacross;

means for applying a voltage across the device at a level below the threshold voltage;

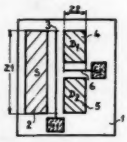
a first optically variable resistance device connected in series between one side of the voltage applying means and the semiconductor device and adapted to increase the voltage across the semiconductor device when a beam of light is directed at the first optically variable resistance device and thereby turn the semiconductor device on to its light emitting condition; and

a second optically variable resistance device connected in series with the semiconductor device and the other side of the voltage applying means and adapted to decrease the voltage across the semiconductor device when a beam of light is directed at the second optically variable resistance device to turn the semiconductor off to its non-emitting condition.

4,977,434
FIELD-EFFECT SEMICONDUCTOR DEVICE COMPRISING AN ANCILLARY ELECTRODE

Daniel Delagebeaudeuf, Saclay; Henri Derewonko, Voisins le Bretonneux; Jean J. Godart, Boulogne; Patrick Resneau, Boulogne, and Pietre Gibeau, Voisins le Bretonneux, all of France, assignors to Thomson Hybrides et Microondes, Paris, France

Filed Jul. 28, 1988, Ser. No. 225,165
Claims priority, application France, Jul. 31, 1987, 87 10879
Int. Cl.[5] H01L *29/80*
U.S. Cl. 357—22 **7 Claims**

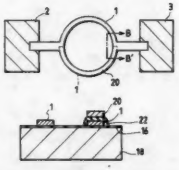


1. A field-effect semiconductor device comprising:
a semiconductor body formed by a substrate, a source, and at least one active layer;
a first gate metallization;
a drain metallization made up of two parts, wherein said first gate metallization and said drain metallization define a main transistor with a main channel formed between said gate and drain metallizations, and wherein said two drain metallization parts are separated from each other by a second channel of semiconductor material;
a second gate metallization deposited on said second channel of semiconductor material;
said two drain metallization parts, said second gate metallization and said second channel defining a second transistor.

4,977,435
SEMICONDUCTOR DEVICE WITH A SPLIT CONDUCTION CHANNEL

Toshiyuki Yoshimura, Kokubunji; Eiji Takeda, Koganei; Hideyuki Matsuoka, Kokubunji, and Yasuo Igura, Kawasak, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Oct. 31, 1988, Ser. No. 264,785
Claims priority, application Japan, Oct. 30, 1987, 62-272944; Dec. 25, 1987, 62-327134; Dec. 28, 1987, 62-329875; Jul. 11, 1988, 63-170957
Int. Cl.[5] H01L *29/68, 29/78, 29/161, 25/04*
U.S. Cl. 357—23.5 **29 Claims**

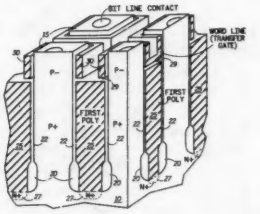


1. A semiconductor transistor comprising:
a first semiconductor layer having a source region and a drain region formed therein separated from one another by a portion of said first semiconductor layer;
a gate electrode formed over said portion of said first semiconductor layer between said source and drain regions, wherein said gate electrode splits to form first and second branches at a first location adjacent to said source region and wherein said first and second branches rejoin one another at a second location adjacent to said drain region so that application of a potential to said gate electrode will produce first and second two-dimensional carrier conduction paths adjacent to a surface of said portion of said first semiconductor layer under said first and second branches between said source and drain regions; and
means for modifying the phase of carriers passing through said first conduction path between said source and drain regions relative to the phase of carriers passing through said second conduction path between said source and drain regions to produce a phase difference for carriers received at said drain region through said first and second conduction paths,
wherein said phase modifying means comprises a floating gate electrode formed over said first branch of said gate electrode.

4,977,436
HIGH DENSITY DRAM

Kazuhisa Tsuchiya; Yoshio Enosawa, and Motohiro Kitajima, all of Sendai, Japan, assignors to Motorola, Inc., Schaumburg, Ill.

Filed Jul. 25, 1988, Ser. No. 223,835
Int. Cl.[5] H01L *29/68, 29/06, 27/10*
U.S. Cl. 357—236 **11 Claims**



1. A high density dynamic random access memory comprising:
a semiconductor substrate having a plurality of spaced apart pedestals formed thereon and defining a plurality of trenches therebetween;
semiconductor material positioned in the trenches and isolated from said pedestals by a capacitor dielectric to form a plurality of capacitors in conjunction with said plurality of pedestals, said semiconductor material electrically connected to said substrate;
an insulating field oxide surrounding said pedestals proximate the bottom of said trench;
a plurality of field effect transistors (FETs) formed in the trenches, each having a gate electrode, a drain electrode and a vertical source, each of said plurality of transistors being formed in conjunction with one of the plurality of capacitors;
first electrically conducting lines connecting selected ones of the drain electrodes of the plurality of transistors; and
second electrically conducting lines connecting selected ones of the gate electrodes of the plurality of transistors.

4,977,437

METHOD AND APPARATUS FOR PERFORMING PRESSURE DEVELOPEMENT WITH A PAIR OF PRESSURIZING ROLLERS

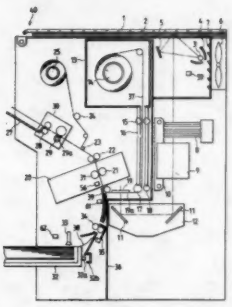
Shin Asai, Ichinomiya; Michitoshi Akao, Nagoya; Tokunori Katoh; Kenji Sakakibara, both of Ichinomiya; Takesi Izaki, Nagoya, and Hiroshi Morisaki, Nishikasugai, all of Japan, assignors to Brother Kogyo Kabushiki Kaisha, Aichi, Japan

Filed Jan. 30, 1990, Ser. No. 472,180

Claims priority, application Japan, Jan. 30, 1989, 1-20406; Jan. 30, 1989, 1-20505; Jan. 30, 1989, 1-20507; Jan. 30, 1989, 1-20508; Jan. 31, 1989, 1-22926

Int. Cl.[5] G03B *27/32*

U.S. Cl. 355—27 31 Claims



1. An image recording apparatus for recording an image of an original document on a developer sheet with the use of a photosensitive pressure sensitive sheet, the developer sheet having leading and trailing ends and having a surface coated with a developer material, the photosensitive pressure-sensitive sheet having a surface coated with immense number of photosensitive and pressure-rupturable microcapsules, each encapsulating a chromogenic material, the apparatus comprising:

exposure means for exposing the photosensitive pressure-sensitive sheet to imaging light over a part of the photosensitive pressure-sensitive sheet, the part being defined by leading and trailing exposure lines to selectively change mechanical strength of the microcapsules in the part and to thereby form a latent image thereon;

first conveying means for conveying the photosensitive pressure-sensitive sheet formed with the latent image thereon;

pressure developing means having a pressure developing position for pressure developing the latent image and reproducing a visible image on the developer sheet upon reaction of the chromogenic material released from ruptured microcapsules with the developer material, said pressure developing means including a pair of pressurizing members;

second conveying means for conveying the developer sheet in a direction toward said pressure developing means;

actuating means for actuating at least one of said first and second pressurizing members to selectively bring said first and second pressurizing members in a spaced apart condition and an intimate contact condition, said first and second pressurizing members being held in the spaced apart condition when the developer sheet is conveyed by said second conveying means; and

stopping means for temporarily stopping the conveyance of the developer sheet by said second conveying means when the leading end of the developer sheet has been introduced between the pressurizing members held in spaced apart condition, wherein said actuating means actuates at least one of said first and second pressurizing members to bring them in the intimate contact condition at a timing when the exposure leading end of the photosensitive pressure-sensitive sheet is in alignment with the leading end of the developer sheet to thus start the pressure development.

4,977,438

TURN-OFF SEMICONDUCTOR COMPONENT AND USE THEREOF

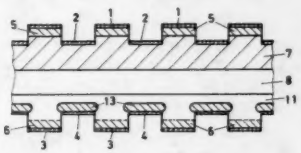
Christiaan Abbas, Baden, Switzerland, assignor to BBC Brown, Boveri Ltd., Baden, Switzerland

Continuation of Ser. No. 26,431, Mar. 16, 1987, abandoned. This application Mar. 23, 1989, Ser. No. 327,406

Claims priority, application Switzerland, Mar. 20, 1986, 1114/86

Int. Cl.[5] H01L *29/740*; H03K *17/720*

U.S. Cl. 357—38 2 Claims



1. Turn-off semiconductor device comprising:

a cathode and an anode;

a plurality of differently doped layers arranged between said cathode and said anode, said plurality of differently doped layers defining the inner structure of a thyristor which can be turned off via a gate and comprising a four-layer sequence consisting of an outer layer on an anode side which is a p-doped anode layer, an n base layer, a p base layer and an outer layer on a cathode side which is an n-doped cathode layer;

a first gate arranged on the cathode side for controlling turning off the device and having a first gate contact, wherein said cathode layer is subdivided into strip-shaped areas by first trenches projecting into the p base layer and the first gate contact is formed at the bottoms of said first trenches, thereby creating a step-like current controlled gate-cathode structure;

a weakly p-doped channel layer provided between the n base layer and the anode layer; and

a second gate arranged on the anode side and having a second gate contact, wherein said anode layer is subdivided into strip-shaped areas by second trenches projecting into the p channel layer, and the second gate contact is arranged in each case at the bottoms of said second trenches and is separated from the p channel layer by n gate area located thereunder, thereby creating a step-like field-controlled gate-anode structure.

4,977,439

BURIED MULTILEVEL INTERCONNECT SYSTEM

Agerico L. Esquivel, 13912 Waterfall Way, Dallas, Tex. 75240, and Allan T. Mitchell, 2913 Green Meadow, Garland, Tex. 75042

Filed Apr. 3, 1987, Ser. No. 34,305

Int. Cl.[5] H01L *27/12, 29/06, 29/78*

U.S. Cl. 357—49 14 Claims

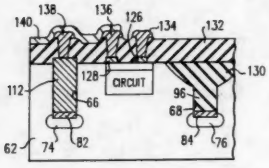
1. A substrate with buried level interconnects comprising:

a trench disposed at the surface of the substrate, and having a bottom surface and two side surfaces;

a first conductive layer disposed on the bottom surface of said trench;

conductive plugs formed at selected locations in said trench and extending from the conductive layer to the surface of

the substrate to provide electrical contact therebetween; and



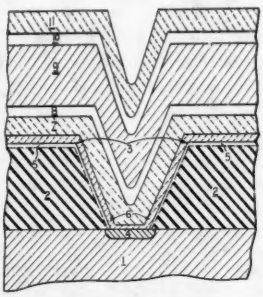
an insulating material disposed within said trench over said conductive layer and between said conductive plugs.

4,977,440

STRUCTURE AND PROCESS FOR CONTACTING AND INTERCONNECTING SEMICONDUCTOR DEVICES WITHIN AN INTEGRATED CIRCUIT

E. Henry Stevens, 18 Loma Linda Dr., Colorado Springs, Colo. 80906

Filed Jan. 4, 1989, Ser. No. 293,438
Int. Cl.[5] H01L 23/48, 21/44
U.S. Cl. 357—68 **18 Claims**



1. A multi-region material structure for contacting and interconnecting semiconductor devices within a VLSI circuit, the material structure comprising:

a semiconductor wafer;

a first dielectric region overlying the semiconductor wafer, said first dielectric region including openings therein for permitting electrical contact to terminals of the semiconductor devices;

a low-resistance contact region in the semiconductor wafer underlying the openings in said first dielectric region;

a first metallurgic barrier region overlying the first dielectric region and the low-resistance contact region, said first metallurgic barrier region comprising a compound of a refractory metal, oxygen, and nitrogen;

a first material bonding region sandwiched between said first metallurgic barrier region and said first dielectric region;

a metallurgic barrier and current carrying region overlying said first metallurgic barrier region, said metallurgic barrier and current carrying region comprising a compound of a refractory metal, oxygen, and nitrogen that is different from the compound comprising said first metallurgic barrier region, said metallurgic barrier and current carrying region having a resistivity of less than 60 micro-ohm-centimeters;

a primary current carrying path region overlying said metallurgic barrier and current carrying region, for providing, in combination with said metallurgic barrier and current carrying region, a composite path for carrying current between interconnected semiconductor devices; and

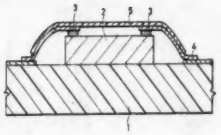
a second material bonding region sandwiched between said metallurgic barrier and current carrying region and said primary current carrying path region.

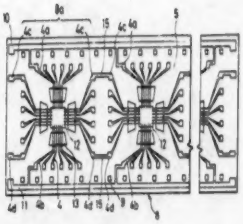
4,977,441

SEMICONDUCTOR DEVICE AND TAPE CARRIER

Hideya Ohtani, Aichi; Toshimitsu Momoi, Higashimurayama; Eiji Ooi, Kawagoe; Shuhei Sakuraba, Kodaira; Masayuki Morita, Nishitama, and Yoshiaki Wakashima, Kawasaki, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Continuation of Ser. No. 247,636, Sep. 22, 1988, abandoned, which is a division of Ser. No. 946,951, Dec. 29, 1986, abandoned. This application Apr. 30, 1990, Ser. No. 515,344
Int. Cl.[5] H01L 23/48, 29/40
U.S. Cl. 357—70 **27 Claims**





1. A tape carrier for a semiconductor device comprising:

(a) an insulation tape having a longitudinal shape on which a plurality of tape carrier units are provided, each tape carrier unit having a wiring pattern with a plurality of leads, the tape carrier units being uniformly spaced along a length of the tape, the length being in the direction of the longitudinal shape, the plurality of leads including control signal leads, the control signal leads of adjacent tape carrier units being electrically connected by conductive lines; and

(b) at least one trunk lead disposed along the entire length of the tape, with a plurality of branched leads branched from the at least one trunk lead, a respective branched lead of the plurality of branched leads being electrically connected to a lead of a corresponding tape carrier unit.

4,977,442

LEAD FRAME AND METHOD OF PRODUCING ELECTRONIC COMPONENTS USING SUCH IMPROVED LEAD FRAME

Toshiaki Suzuki; Yoji Murakami; Masao Kobayashi, and Osamu Yamauchi, all of Aizuwakamatsu, Japan, assignors to Fujitsu Limited, Kawasaki, Japan

Filed Feb. 24, 1989, Ser. No. 314,793
Claims priority, application Japan, Feb. 24, 1988, 63-042815
Int. Cl.[5] H01L 23/48, 23/54
U.S. Cl. 357—70 **3 Claims**

1. A lead frame for use in the production of an electric component, comprising:

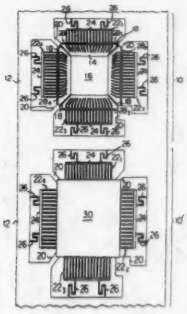
an outside frame portion having a central opening formed therein and defining interior sides of the outside frame portion;

a mount portion for mounting an electronic component thereon, supported by said outside frame portion and disposed within said central opening thereof with the exterior sides of the mount portion in spaced relationship from the corresponding interior sides of the outside frame portion;

at least one lead element array, comprising plural lead ele-

ments, disposed along an associated one of said exterior sides of said mount portion and a common tie bar element associated with each said lead element array, said common tie bar element being integrated with the outer ends of said plural lead elements of said array and thereby connecting together all of said plural lead elements thereof; and

at least two expandable tie bar elements associated with each



said lead element array, extending between and interconnecting said outside frame portion and said associated lead element array thereby to support said lead element array on said outside frame portion, each of said expandable tie bar elements being connected at one end thereof to said outside frame portion and at the other end thereof to said common tie bar element and including a shaped portion which can be expanded by deformation thereof.

4,977,443

SEMICONDUCTOR MODULE AND AN ELECTRONIC COMPUTER USING THE SEMICONDUCTOR MODULE

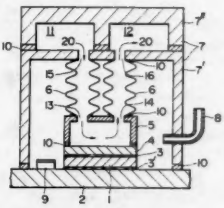
Shiro Kobayashi, Hitachi; Masahiko Itoh, Hitachiota, and Masakiyo Izumiya, Mito, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Sep. 19, 1989, Ser. No. 409,139

Claims priority, application Japan, Sep. 21, 1988, 63-234986

Int. Cl.[5] H01L *23/44, 23/36*

U.S. Cl. 357—82 **11 Claims**



1. A semiconductor module comprising semiconductor elements, cooling structures for cooling said semiconductor elements by liquid refrigerant, and a housing for accommodating said semiconductor elements and said cooling structures, wherein within said housing, there is supplied or enclosed sealingly a reactive gas which reacts with ions of a metal constituting said cooling structures to form a chemical compound hard to dissolve to the liquid refrigerant but does not react with the metal itself constituting said cooling structure.

4,977,444

SEMICONDUCTOR COOLING APPARATUS

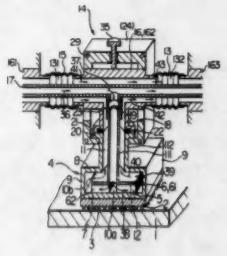
Tadakatsu Nakajima; Heikichi Kuwahara; Shigeo Ohashi; Motohiro Satoh; Toshihiro Yamada, all of Ibaraki; Kenichi Kasai, Ushiku; Satomi Kobayashi, Nagareyama, and Akihide Watanabe, Tsukuba, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Oct. 24, 1988, Ser. No. 261,639

Claims priority, application Japan, Oct. 26, 1987, 62-268166

Int. Cl.[5] H01L *25/04, 39/02, 23/16*

U.S. Cl. 357—82 **19 Claims**



1. A semiconductor cooling apparatus comprising:

cooling blocks to be individually attached to plural semiconductor chips disposed on a base plate, each cooling block to be brazed to form one united body with a corresponding semiconductor chip and having an inner space for a flow of coolant;

coolant supply blocks provided separately from one another in one-to-one corresponding relation to said cooling blocks, each coolant supply block having an inner space for supply of coolant to a corresponding cooling block;

flexible piping connecting adjacent coolant supply blocks with each other in series;

sealing means for detachably connecting each cooling block with a corresponding coolant supply block; and

flow path partition means respectively provided in said inner spaces of each cooling block and a corresponding coolant supply block for forming at least two substantially separated flow paths for the coolant when said partition means of each cooling block and said partition means of a corresponding coolant supply block are fitted to each other.

4,977,445

SYNC-SIGNAL REPRODUCING CIRCUIT FOR USE IN TELEVISION RECEIVER

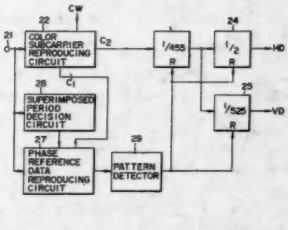
Kiyoyuki Kawai, Yokosuka, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Apr. 13, 1989, Ser. No. 337,473

Claims priority, application Japan, May 9, 1988, 63-112270

Int. Cl.[5] H04N *5/04, 5/06*

U.S. Cl. 358—17 **14 Claims**



1. A sync-signal reproducing circuit for obtaining sync signals from a color television signal, said sync-signal reproducing circuit comprising:

receiving means for receiving the color television signal, the color television signal containing phase reference data synchronized with a color burst signal in a predetermined position in a vertical blanking interval, the phase reference data being digital data having a predetermined pattern;

color subcarrier reproducing means for reproducing a color subcarrier in accordance with the color burst signal in the color television signal received at said receiving means and outputting a reproduced signal;

sync signal generating means, responsive to the reproduced signal output from said color subcarrier reproducing means, for generating sync signals;

phase reference data reproducing means, responsive to the color television signal received at said receiving means and the reproduced signal output from said color subcarrier reproducing means, for reproducing the phase reference data from the color television signal and outputting a reproduced phase reference data; and

pattern detector means, responsive to the reproduced reference data output from said reference data reproducing means, for controlling said sync signal generating means to keep the phases of the sync signals output from said sync signal generating means in sync with the reproduced phase reference data when a pattern of the reproduced phase reference data output from said reference data reproducing means has the predetermined pattern,

wherein said sync signal generating means include:

first frequency dividing means for dividing the frequency of the reproduced signal output from said color subcarrier reproducing means to generate a horizontal sync signal; and

second frequency dividing means for dividing the frequency of the reproduced signal output from said color subcarrier reproducing means to generate a vertical sync signal, and

wherein said pattern detector means includes reset signal generating means, responsive to the reproduced phase reference data output from said phase reference data reproducing means, for generating a reset signal adapted to reset said first and second frequency dividing means.

4,977,446

DIGITAL CONVERGENCE CORRECTING APPARATUS

Makoto Shiomi, Yokohama; Michitaka Ohsawa, Fujisawa; Toshiyuki Sakamoto, Fujisawa; Kuninori Matsumi, Fujisawa; Kosuke Ozeki, Yokohama; Ikuo Yuki, Yokohama, and Kenji Sato, Yokohama, all of Japan, assignors to Hitachi, Ltd., Tokyo and Hitachi Video Engineering, Inc., Yokohama, both of, Japan

Filed Jan. 27, 1989, Ser. No. 302,353

Claims priority, application Japan, Jan. 29, 1988, 63-17101; Aug. 24, 1988, 63-208422

Int. Cl.[5] H04N *9/28*

U.S. Cl. 358—60 **10 Claims**

1. A digital convergence correcting apparatus comprising:

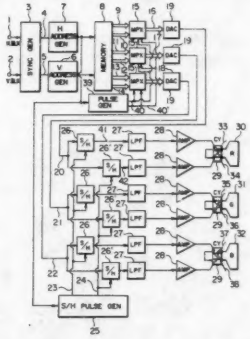
a digital memory for storing digital correction data corresponding to correction values at convergence adjustment points indicative of a plurality of points on at least one display screen divided in the horizontal and vertical directions;

at least one multiplexer for reading out at least two kinds of seid digital correction data from said memory and for time sharingly multiplexing said at least two kinds of digital correction data so as to produce a multiplexed signal;

at least one digital/analog converter for receiving the multiplexed signal from said multiplexer and for digital/analog converting said multiplexed signal so as to produce an analog signal;

at least two sample and hold circuits coupled to said at least one digital/analog converter for extracting at least two kinds of analog correction data from said analog signal output from said digital/analog converter and for sampling and holding said extracted correction data; and

at least two convergence correcting means which are driven on the basis of the respective correction data held by said



at least two sample and hold circuits for correcting said digital convergence.

4,977,447

COLOR CATHODE RAY TUBE

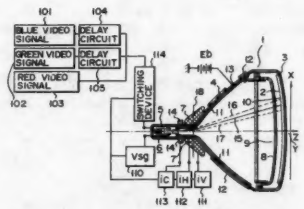
Shigeo Takenaka; Eiji Kamohara, and Takashi Nishimura, all of Fukaya, Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Continuation of Ser. No. 312,313, Feb. 17, 1989, abandoned, which is a continuation of Ser. No. 214,871, Jun. 22, 1988, abandoned, which is a continuation of Ser. No. 853,763, Apr. 18, 1986, abandoned. This application Aug. 28, 1989, Ser. No. 399,443

Claims priority, application Japan, Apr. 19, 1985, 60-82567; May 13, 1985, 60-99615

Int. Cl.[5] H01J *29/50*

U.S. Cl. 358—66 **37 Claims**



1. A color cathode ray apparatus comprising:

means for generating a vertical deflecting signal having first predetermined duration, Tv;

means for generating horizontal deflecting signals during the first predetermined duration Tv, each corresponding to one scanning line and having first, second and third horizontal deflecting signal components, each of the components having a second duration Th within the first duration Tv;

means for sequentially generating first, second and third video signal components corresponding to the one scanning line in synchronism with the horizontal deflecting signal components within a third predetermined period equal to three times duration Th, the third period therefore having a duration 3×Th, each video signal being generated within duration Th;

means for applying predetermined first and second time delays to the second and third video signal components,

respectively, the first time delay being shorter than the second time delay;

means for generating first, second and third beam switching signals in synchronism with the horizontal deflecting signal components;

means for generating fourth, fifth and sixth beam switching signals in synchronism with the horizontal deflecting signal components;

a vacuum envelope provided with a faceplate;

a phosphor screen formed on the faceplate and including a plurality of groups of phosphor elements, each group of phosphor elements capable of emitting different color light rays;

an electron gun, provided in the vacuum envelope and sequentially energized by the first video signal component and the delayed second and third video signal components, for emitting a single electron beam and focusing the electron beam on the phosphor screen;

first auxiliary deflecting means for stepwise deflecting the single electron beam in response to the first, second and third beam switching signals to produce first, second and third apparent beams corresponding to the first, second and third video signal components, which are sequentially directed in different directions;

second auxiliary deflecting means for stepwise deflecting the first, second and third apparent beams in response to the fourth, fifth and sixth beam switching signals to sequentially direct the first, second and third apparent beams to a scanning line on the screen;

a shadow mask facing the phosphor screen in the envelope and having apertures arranged in a predetermined array, each aperture causing the apparent beams to impinge on phosphor elements corresponding to said apparent beams, respectively, so that said different color light rays are emitted from the phosphor screen; and

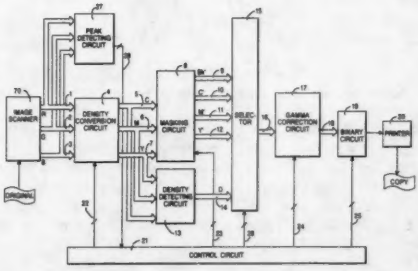
deflecting means, energized by the horizontal and vertical deflecting signals, for deflecting the first, second and third apparent beams in horizontal and vertical directions, the scanning line on the screen being scanned with each of the first, second and third apparent beams during a respective duration Th and sequentially scanned with the first, second and third apparent beams during the third predetermined period 3×Th.

4,977,448

COLOR IMAGE PROCESSING APPARATUS HAVING EXACT COLOR REPRODUCTION CAPABILITY

Kazuyuki Murata, Katano; Kinya Kanno, Neyagawa, and Katsuhiro Kanamori, Kawasaki, all of Japan, assignors to Matsushita Electric Industrial Co., Ltd., Osaka, Japan

Filed Dec. 16, 1988, Ser. No. 285,525
Int. Cl.[5] H04N *1/46*
U.S. Cl. 358—75 **10 Claims**



1. A color image processing apparatus comprising:

density conversion means for performing a conversion of densities of a plurality of input color signals, including a ground color removal means for forcing a color signal in the plurality of input color signals having a level more than a predetermined level into a signal corresponding to white, to obtain a plurality of density signals;

masking means for performing a color correction of the plurality of density signals to obtain a a plurality of color-corrected signals; and

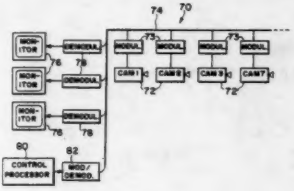
selecting means for selecting one signal from the plurality of color-corrected signals.

4,977,449

VIDEO SWITCHING SYSTEMS USING FREQUENCY AGILE MODULATORS AND DEMODULATORS

Jack B. Morgan, 2040 Pheasant Hill La., Auburn, Calif. 95603

Filed Sep. 19, 1988, Ser. No. 246,555
Int. Cl.[5] H04N *7/10, 7/18*
U.S. Cl. 358—86 **3 Claims**



1. A broadband RF video surveillance system comprising:

a plurality of video surveillance cameras adapted to be placed at respective operative locations remote from a central monitoring location;

a cable extending from the central location to the remote locations;

a frequency agile modulator for each video camera, respectively, the modulators being coupled between the cable and respective cameras the modulators being responsive to control signals received over the cable to each select a modulation frequency;

a number of video monitors at said central location;

a demodulator for each monitor, respectively, the demodulators being coupled between the cable and respective monitors; and

means at said central location for controlling the frequencies of the modulators by sending the modulator control signals over the cable to selectively direct the video signals from the video cameras to the monitors.

4,977,450

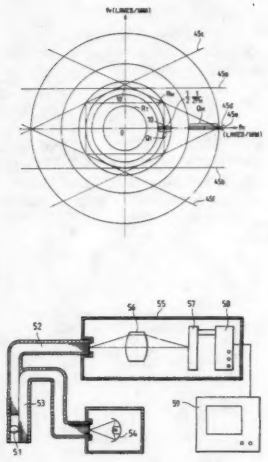
IMAGE PICKUP SYSTEM FOR AN ENDOSCOPE USING A FIRST FILTER MATCHED TO A FREQUENCY OF A FIBER ARRAY AND A SECOND MATCHED TO A FREQUENCY OF AN IMAGE PICKUP DEVICE

Akira Yokota, Sagamihara, Japan, assignor to Olympus Optical Co., Ltd., Tokyo, Japan

Filed Nov. 15, 1989, Ser. No. 437,035
Claims priority, application Japan, Nov. 18, 1988, 63-290024
Int. Cl.[5] A61B *1/04*; H04N *7/18*
U.S. Cl. 358—98 **17 Claims**

2. An image pickup system for endoscopes comprising an objective lens forming an image of an object; an image guide fiber bundle transmitting the object image formed by the objective lens; and an imaging lens unit reforming the object image appearing on an exit end face of the image guide fiber bundle onto a solid-state image pickup device, wherein a first optical low-pass filter having a spatial frequency response depending on an array of fibers of said image guide fiber bundle and a second optical low-pass filter having a spatial fre-

quency response depending on a sampling frequency of said solid-state image pickup device being provided in an imaging



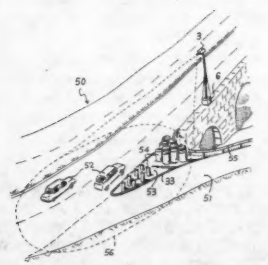
optical path from the exit end face of said image guide fiber bundle to said solid- state image pickup device.

4,977,451

PROCESS AND APPARATUS FOR AUTOMATIC SURVEILLANCE OF A SITE

Serge Besnard, 3, rue Paul Gauguin, 91440 Bures/Yvette, France

Filed Dec. 19, 1989, Ser. No. 452,652
Claims priority, application France, Dec. 21, 1988, 88 16939
Int. Cl.[5] H04N 7/18
U.S. Cl. 358—108 **14 Claims**



1. An automatic surveillance process for a site in which the occurrence of incidental events is awaited, according to which a recording is made, on an erasable medium of finite storage capacity, of data collected at the time of occurrence of said awaited event; wherein said process essentially comprises:

dividing said recording medium into a series of successive sections each corresponding to a fraction of the total recording length provided by said medium;

while said awaited event does not occur, repeatedly recording on a same section of said medium data collected in the course of time, with concomitant erasure of data previously recorded on that section;

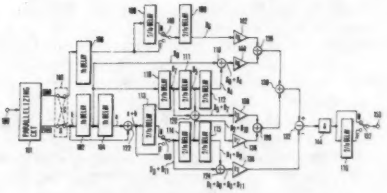
when said awaited event occurs, causing a transfer of said same section to the following section, on which is continued said data recording, without erasure of data recorded on the previous section.

4,977,452

SAMPLED-VALUE CODE PROCESSING DEVICE

Masahiko Enari; Makoto Shimokoriyama, and Akio Fujii, all of Kanagawa, Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Filed Dec. 30, 1988, Ser. No. 292,508
Claims priority, application Japan, Jan. 14, 1988, 63-006067
Int. Cl.[5] H04N 7/12
U.S. Cl. 358—138 **11 Claims**



1. A sampled-value code processing device comprising:

(a) input means for inputting a sampled-value code series representing sampled values of an information signal at a predetermined period;

(b) code series converting means for forming, from the sampled-value code series input by said input means, a first code series consisting of codes related to a group of sampled values determined according to a predetermined rule and a second code series consisting of codes related to sampled values other than the group of sampled values, and for outputting the first code series and the second code series at an output period longer than the predetermined period, said converting means including a parallelizing circuit for outputting a plurality of code series by parallelizing a plurality of codes in the sampled-value code series; and

(c) filtering means for applying a filtering process to the first code series output from said converting means by using said second code series.

4,977,453

SYSTEM AND APPARATUS FOR TRANSMITTING AND RECEIVING HIGH DEFINITION TELEVISION PICTURES OVER A CHANNEL HAVING A COMPARATIVELY NARROW PASSBAND

Frédéric Fonsalas, Grigny; Pascal Hayet, Chateney Malabry; Jean-Yves Lejard, Paris, and Marcel Le Queau, Ozoir la Ferriere, all of France, assignors to U.S. Philips Corporation, New York, N.Y.

Filed Sep. 30, 1988, Ser. No. 252,247
Claims priority, application France, Oct. 9, 1987, 87 13982
Int. Cl.[5] H04N 7/04
U.S. Cl. 358—138 **3 Claims**

1. A system for transmitting high definition television pictures over a channel having a comparatively narrow passband, said pictures comprising a plurality of television lines of at least one parity, and each line comprising a plurality of samples defining elements forming said pictures, said system comprising:

(a) a transmitting circuit for transmitting said samples over said channel in accordance with four transmission fields, said transmitting circuit comprising:

(i) means for filtering said samples so as to provide selected samples;

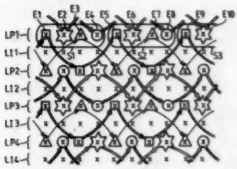
(ii) means coupled to said filtering means, for sub-sampling

said selected samples and processing them in sets, each set having four consecutive sample positions along lines of a given parity, and

(iii) means for transmitting from sets positioned along each said line of given parity;

a first transmission field comprising, for each line of said given parity and for its first adjacent line of said given parity, a plurality of selected samples having a first sample position in each set;

a second transmission field comprising, for each line of said given parity and for its second adjacent line of said given parity, a plurality of seleced samples having a second sample position in each set;



a third transmission field comprising, for each line of said given parity and for its first adjacent line of said given parity, a plurality of selected samples having a third sample position in each set; and

a fourth transmission field comprising, for each line of said given parity and for its second adjacent line of said given parity, a plurality of selected samples having a fourth sample position in each set; and

(b) a receiving circuit comprising a display circuit for converting said selected samples into a picture having a normal definition.

4,977,454

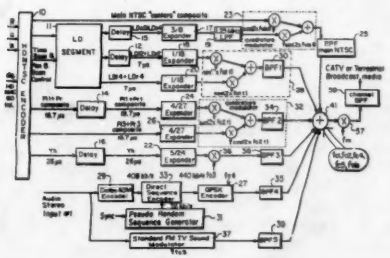
HDNTSC CHANNEL WITH FREQUENCY MULTIPLEXING

Mikhail Tsinberg, Riverdale, N.Y., assignor to U.S. Philips Corporation, New York, N.Y.

Filed Aug. 31, 1988, Ser. No. 239,096

Int. Cl.[5] H04N *7/04*

U.S. Cl. 358—141 **22 Claims**



16. Method for generating frequency multiplexed television signal, comprising the steps of:

receiving conventional image signals, and at least a first and second set of augmentation signals;

time expanding said first and second set of augmentation signals, thereby creating a first and second set of time expanded augmentation signals; and

frequency multiplexing said conventional image signals, said first set of time expanded augmentation signals and second set of time expanded augmentation signals, thereby generating said frequency multiplexed television signal.

4,977,455

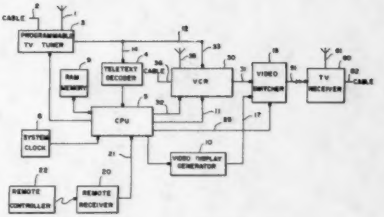
SYSTEM AND PROCESS FOR VCR SCHEDULING

Patrick Young, San Mateo, Calif., assignor to Insight Telecast, Inc., Palo Alto, Calif.

Filed Jul. 15, 1988, Ser. No. 219,971

Int. Cl.[5] H04N *7/087, 7/04*; G11B *27/02*; H04H *1/00*

U.S. Cl. 358—142 **24 Claims**



1. A system to allow interactive selection for presentation to a user of supplemental broadcast information pertaining to a primary broadcast, which comprises a recording device, a broadcast receiver, a data processor connected to said recording device and to said broadcast receiver, said data processor including means responsive to a cue broadcast at a first time with, and in addition to, a program comprising the primary broadcast for presenting the cue on the broadcast receiver during, and simultaneous with presenting the primary broadcast on the receiver, the cue indicating the availability at a second time later than the first time of the supplemental broadcast information pertaining to the primary broadcast, means connected to the data processor for receiving a user response to the cue, and means responsive to the user response to the cue for controlling said recording device to record the supplemental broadcast information at the second time.

8. A system for recording and indexing broadcast information, which comprises a recording device for receiving and recording the broadcast information, means for receiving and storing schedule information, a data processor connected to said recording device, said data processor including means for creating and storing an index of location and identification of recorded broadcast information from index inputs received from the schedule information and from said recording device, said system including a memory for storing information identifying a local channel number on which a cable channel is supplied.

4,977,456

LIQUID CRYSTAL VIEWFINDER

Yoshikiyo Furuya, Suwa, Japan, assignor to Seiko Epson Corporation, Tokyo, Japan

Continuation of Ser. No. 159,457, Feb. 18, 1988, abandoned, which is a continuation of Ser. No. 870,263, Jun. 3, 1986, abandoned. This application Feb. 13, 1990, Ser. No. 479,192

Claims priority, application Japan, Jun. 4, 1985, 60-120772; Feb. 20, 1986, 61-35733

Int. Cl.[5] H04N *5/30, 5/232*

U.S. Cl. 358—213.13 **27 Claims**

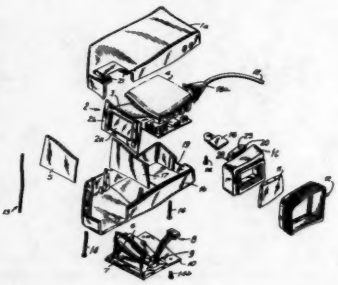
1. An electronic viewfinder for reproducing an image representative of video signals captured by a video camera used by a viewer, the viewfinder comprising:

a liquid crystal assembly which includes liquid crystal display panel means responsive to said video signals for reproducing the image, said liquid crystal display panel means having a front surface and a rear surface;

housing means for enclosing the liquid crystal display panel means;

artificial illuminating means located within the housing means and directly behind the rear surface of the liquid crystal display panel means, relative to the viewer, for illuminating the liquid crystal display panel means;

first diffusing means located between the liquid crystal display panel means and artificial illuminating means for controlling the illumination provided by the illuminating means so as to uniformly irradiate the surface of the liquid crystal display panel means facing the illuminating means;



circuit means coupled to the video camera and the liquid crystal display panel means and including a main electric circuit assembly, said circuit means for supplying the video signals to the liquid crystal panel display means;

first detachable connector means for detachably coupling the liquid crystal assembly to the main electric circuit assembly; and

second detachable connector means for detachably coupling said artificial illuminating means to said main electric circuit assembly.

4,977,457

AUTOFOCUS DEVICE FOR DETERMINING AN IN-FOCUS AND REAL IN-FOCUS STATE

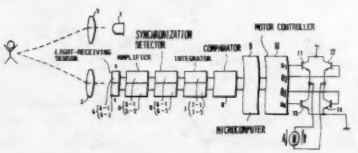
Yasuhiro Tamekuni, Kanagawa; Takashi Amikura, Tokyo, and Toru Ohara, Kanagawa, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Filed May 3, 1989, Ser. No. 347,156

Claims priority, application Japan, May 10, 1988, 63-113096; May 10, 1988, 63-113097; Jul. 27, 1988, 63-187273

Int. Cl.[5] H04N 5/232

U.S. Cl. 358—227 17 Claims



1. An autofocus device having a first determination circuit for determining whether or not a lens is in an in-focus state on the basis of a focus detection result detected by a focus detection circuit, in which the lens is driven in the direction of an in-focus position when determination of the in-focus state is not made by said first discrimination circuit, said device comprising:

(A) a second discrimination circuit for determining whether or not the determination of the in-focus state has been effected by said first discrimination circuit for a predetermined duration or more;

(B) a motor circuit for driving the lens in the direction of an in-focus position when the determination of the in-focus state is not made by said first determination circuit, said motor circuit having a first control state in which motor terminals are short-circuited when the determination of the in-focus state has been made by said first determination circuit and a second control state in which said motor terminals are opened when a determination has been made by said second determination circuit that the determination of the in-focus state has been made for the predetermined duration or more.

4,977,458

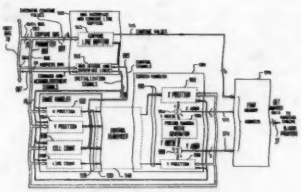
APPARATUS FOR ADDRESSING A FONT TO SUPPRESS MOIRE PATTERNS OCCURRING THEREBY AND A METHOD FOR USE THEREIN

Edward M. Granger; John F. Hamilton, Jr., and Larry G. Wash, all of Rochester, N.Y., assignors to Eastman Kodak Company, Rochester, N.Y.

Filed Nov. 16, 1988, Ser. No. 272,591

Int. Cl.[5] H04N 1/40

U.S. Cl. 358—456 16 Claims



1. In a system for successively addressing a stored font pattern to generate a raster based writing pattern for use in producing a visual depiction of said font pattern within an image, wherein said visual depiction will be formed of separate pixels having a pre-defined spacing occurring therebetween, apparatus for suppressing a Moire pattern occurring in said image, said apparatus comprising:

means for generating a coordinate position of a desired bit residing within said font pattern;

means for generating a substantially random noise value, wherein said noise value is contained within a noise function that has a substantially uniform probability distribution occurring throughout a region having a width equivalent to said spacing and is substantially zero valued elsewhere; and

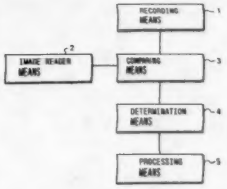
means for summing said noise value with said coordinate position to yield an address to said stored bit pattern whereby said noise value randomly varies a value of a least significant bit occurring in said address so as to substantially suppress said Moire pattern.

4,977,459

INK-JET RECORDING APPARATUS WITH MECHANISM FOR AUTOMATICALLY REGULATING A RECORDING HEAD

Ryuichi Ebinuma, Kawasaki; Yuji Chiba, Isehara, and Nobutoshi Mizusawa, Yamato, all of Japan, assignors to Canon Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 370,883, Jun. 23, 1989, abandoned.
This application Mar. 21, 1990, Ser. No. 500,097
Claims priority, application Japan, Jun. 23, 1988, 63-153633
Int. Cl.[5] H04N 1/034; G01D 15/16; B41J 2/05, 2/165
U.S. Cl. 358—296 21 Claims



7. An ink-jet recording apparatus for recording on a recording medium with a recording head for emitting ink, the apparatus comprising:

signal providing means for providing said recording head with a predetermined recording signal;

a reading mechanism for reading an image recorded on the recording medium by said recording head according to the predetermined recording signal and providing an image signal representative of the image;

a control mechanism for conducting a plurality of different recovery processes on said recording head; and

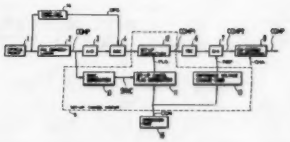
an automatic regulation mechanism for determining the recovery process conducted on said recording head by said control mechanism on the basis of the image signal and the predetermined recording signal.

4,977,460

VIDEO SIGNAL REPRODUCING APPARATUS HAVING SETUP LEVEL ELIMINATION

Mitsuo Hirose, Osaka, Japan, assignor to NEC Home Electronics Ltd., Osaka, Japan

Filed Apr. 28, 1988, Ser. No. 187,252
Claims priority, application Japan, Apr. 30, 1987, 62-107642
Int. Cl.[5] H04N 5/94
U.S. Cl. 358—336 7 Claims



1. An apparatus for producing an accurately reproduced video signal comprising:

means for inputting a video signal;

means for generating a set-up period indication signal if said video signal contains a set-up level during a set-up period;

means for subtracting during said set-up period said set-up level from said video signal if said set-up period indication signal is present; and

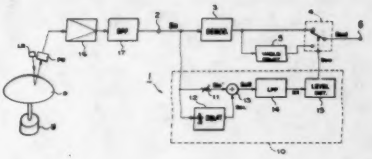
means for amplifying said subtracted video signal to obtain said accurately reproduced video signal.

4,977,461

DROPOUT DETECTING CIRCUIT WITH ONE-HALF WAVELENGTH DELAY

Isao Ichimura, Tokyo, Japan, assignor to Sony Corporation, Tokyo, Japan

Filed Mar. 15, 1989, Ser. No. 323,894
Claims priority, application Japan, Mar. 18, 1988, 63-65334
Int. Cl.[5] H04N 5/94
U.S. Cl. 358—336 6 Claims



1. A circuit for detecting dropout from playback signals reproduced from an optical recording medium, said playback signals having a carrier wave with a center frequency corresponding to a given wavelength and said circuit comprising:

a delay circuit for effecting in said playback signals a delay corresponding in time to one half of said given wavelength of said center frequency of said carrier and thereby producing delayed output signals;

a summation circuit for summing said playback signals and said delayed output signals and thereby producing a sum signal having amplitude substantially equal to two times an amplitude of said playback signal; and

a level detection circuit for detecting when said sum signal has a level that exceeds predetermined offsets levels and thereby producing a detection output signal;

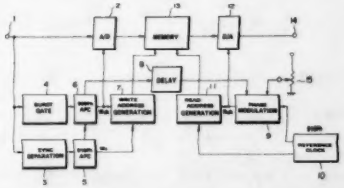
said detection output signal being indicative of a dropout in said playback signals.

4,977,462

APPARATUS FOR CORRECTING A TIME BASE ERROR IN A VIDEO SIGNAL

Kenji Takanashi, and Yoshiaki Wakisaka, both of Kanagawa, Japan, assignors to Sony Corporation, Tokyo, Japan

Filed Mar. 21, 1988, Ser. No. 171,030
Claims priority, application Japan, Mar. 24, 1987, 62-069950; Mar. 24, 1987, 62-069953
Int. Cl.[5] H04N 5/95
U.S. Cl. 358—339 5 Claims



1. A time base correcting apparatus for eliminating time base errors from incoming video signals comprising:

memory means for storing said video signals;

means for generating write clock pulses having a first center frequency which is modulated in accordance with said time base errors in the incoming video signals;

means for generating read clock pulses having a second center frequency different from aid first center frequency;

means for sampling said incoming video signals at sampling positions determined by said write clock pulses;

memory control means for selectively enabling said memory

means to write the sampling incoming video signals therein in accordance with said write clock pulses, and for selectively enabling said memory means to read out said video signals therefrom in accordance with said read clock pulses;

means for sampling the read out video signals at sampling positions determined by said read clock pulses; and

means for modulating said read clock pulses so as to compensate for deviations between said sampling positions at which said incoming video signals and said read out video signals would otherwise be respectively sampled by reason of the frequency difference between said first and second center frequencies.

4,977,463

IMAGE RECORDING APPARATUS FOR MINIMIZING AN OUTPUT SIZE OF PAPER HAVING MARKED AN AREA OF AN INPUT IMAGE

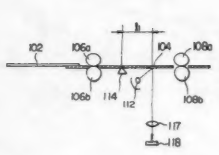
Shigeru Fukuda, Yokohama, Japan, assignor to Ricoh Company, Ltd., Tokyo, Japan

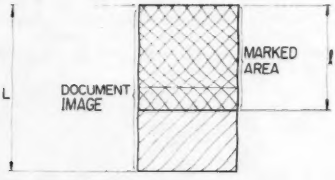
Filed May 16, 1989, Ser. No. 352,407

Claims priority, application Japan, May 16, 1988, 63-117030

Int. Cl.[5] H04N 1/40

U.S. Cl. 358—448 6 Claims





1. An image recorder having an image editing function for recording on a paper only a marked area of image information which is printed on a document, comprising:

reading means for reading the image information on the document;

storing means for storing data, which is the read image information in the form of video data;

recording means for reproducing the stored video data on a paper by reading said video data out of said storing means;

inputting means for marking a particular area of the image information to be recorded on the paper; and

control means for controlling said reading means, said storing means, said recording means and said inputting means such that the image information in the marked area of the document is recorded on a paper which has at least a length which is associated with said marked area and wherein said length is determined in response to said marked area.

4,977,464

METHOD OF PRODUCING HALFTONE IMAGES BY CHOOSING A CONVERSION FUNCTION BASED ON VIRTUAL AND REFERENCE SOLID PIXELS

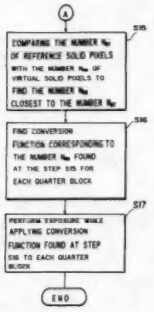
Kunio Ikuta, Kyoto, Japan, assignor to Dainippon Screen Mfg. Co., Ltd., Kyoto, Japan

Filed Nov. 7, 1989, Ser. No. 432,818

Claims priority, application Japan, Nov. 17, 1988, 63-292174

Int. Cl.[5] H04N 1/40

U.S. Cl. 358—448 16 Claims


A
S15
COMPARING THE NUMBER N_{ref} OF REFERENCE SOLID PIXELS WITH THE NUMBER N_{vir} OF VIRTUAL SOLID PIXELS TO FIND THE NUMBER N_{ref} CLOSEST TO THE NUMBER N_{vir}
S16
FIND CONVERSION FUNCTION CORRESPONDING TO THE NUMBER N_{ref} FOUND AT THE STEP S15 FOR EACH QUARTER BLOCK
S17
PERFORM EXPOSURE WHILE APPLYING CONVERSION FUNCTION FOUND AT STEP S16 TO EACH QUARTER BLOCK
END

9. An apparatus for producing a halftone image, comprising:

(a) first memory means for storing image data representing at least a part of an original image for each pixel,

(b) second memory means for storing first screen pattern data specifying a set of first threshold values for said image data, said first threshold values being assigned to respective pixels in a unit pixel block of a prescribed size,

(c) conversion means for converting said image data by a plurality of conversion functions usable to change gradation of said image data, thereby obtaining a plurality of virtual image data,

(d) computing means for computing a reference number of reference solid pixels for each partial block, said partial block being a piece of divided areas of said unit pixel block, said reference solid pixels being to be solid in order to attain a halftone dot area rate specified by said image data for each partial block,

(e) means for comparing each of said plurality of virtual image data with said first screen pattern data for each pixel in each partial block to judge whether or not each pixel is to be solid, thereby computing a virtual number of pixels to be solid for each partial block with respect to each of said plurality of virtual image data,

(f) selecting means for comparing said reference number with said virtual number corresponding to each of said plurality of virtual image data, selecting one of said plurality of virtal image data whose virtual number is closest to said reference number for each partial block, and selecting one of said plurality of conversion functions for each partial block by which selected virtual image data is obtained,

(g) means for indicating a selected conversion function for each partial block to said conversion means, and

(h) means for producing a halftone image as a function of said first screen pattern data and converted image data converted by said selected conversion function in said conversion means.

4,977,465

TAPE RECORDER WITH DECELERATION CONTROL FOR CAPSTAN MOTOR DURING CONNECTION RECORDING

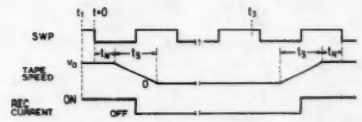
Masahiro Sui, Saitama, Japan, assignor to Pioneer Electronic Corporation, Tokyo, Japan

Filed May 29, 1985, Ser. No. 738,806

Claims priority, application Japan, May 29, 1984, 59-109079; May 29, 1984, 59-109081

Int. Cl.[5] H04N 5/78

U.S. Cl. 360—33.1 3 Claims



1. A tape recording apparatus having a recording head and being changeable between recording and recording pause operating modes, comprising: capstan motor means for driving a recording tape and for which a time required for the speed of the recording tape driven by said capstan motor means to reach zero from a rated value is smaller than a period corresponding substantially to one frame of a recording video signal; means for providing a head changeover signal; means, coupled to said capstan motor means, for controlling a timing of start of deceleration of said capstan motor means such that level transition of said head changeover signal for the recording head occurs in a period of deceleration of said capstan motor means when an operating mode is changed from a recording mode to a recording pause mode; and means, responsive to said head changeover signal, for cutting off a recording current supplied to said recording head at the same time as said level transition of said recording head changeover signal.

4,977,466

MAGNETIC TAPE WIND-UP CONTROL METHOD, AND TAPE WIND-UP APPARATUS

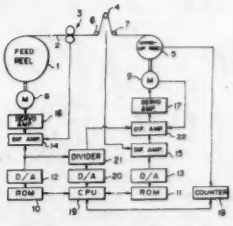
Tomohiro Nakata, Kanagawa, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Jul. 3, 1989, Ser. No. 374,802

Claims priority, application Japan, Jul. 4, 1988, 63-166383; Sep. 30, 1988, 63-247221

Int. Cl.[5] G11B 15/46

U.S. Cl. 360—73.08 11 Claims



1. A magnetic tape wind-up control method for use when a magnetic tape is wound around a wind-up reel in a magnetic tape wind-up apparatus, said apparatus comprising:

(i) a feed reel which is rotated by a feed motor,

(ii) the wind-up reel which is rotated by a wind-up motor,

(iii) a movement detector which is located in the path along which the magnetic tape moves from the feed reel to the wind-up reel and which detects the feed speed of the magnetic tape and the length over which the magnetic tape has been fed,

(iv) a dancing roller which is located between the movement detector and the wind-up reel in order to provide tension on the magnetic tape,

(v) a position detector which detects the position of the dancing arm,

(vi) a means for generating a tape speed command, and

(vii) a means for generating a tape tension command, the speed at which the feed motor is rotated being controlled in accordance with a signal generated by the movement detector, and the speed at which the wind-up motor is rotated being controlled in accordance with a signal generated by the position detector, thereby to control the tension on the magnetic tape,

wherein the improvement comprises the steps of:

(a) detecting the number of revolutions of said wind-up motor,

(b) calculating the outer diameter of a roll of said magnetic tape, which is being wound around said wind-up reel, from the thickness of said magnetic tape and the diameter of a core of said wind-up reel, which values have been stored in advance, and from the number of revolutions completed by said wind-up motor,

(c) dividing the value of said tape speed command by the outer diameter of the roll of said magnetic tape,

(d) generating a rotation speed command signal which represents the quotient of said division, and controlling the speed of rotation of said wind-up motor on the basis of the rotation speed command signal, and

(e) simultaneously controlling the tension on said magnetic tape on the basis of the position of said dancing arm.

3. A tape wind-up control method in which, when a predetermined length of tape fed from a feed reel is wound around a wind-up reel, the speed at which the tape is moved is controlled on the basis of a predetermined reference speed pattern comprising an acceleration zone, which is of a predetermined duration and which starts when the winding-up of the magnetic tape is begun, and a deceleration zone which is of a predetermined duration and which terminates when the winding-up of the magnetic tape is finished,

wherein the improvement comprises the steps of:

(i) selecting at least one check point in the deceleration zone of said reference speed pattern,

(ii) detecting the length, over which said tape has been moved after the winding-up of said tape was begun, at said check point,

(iii) comparing the detected length with a reference tape movement length which is based on said reference speed pattern, and

(iv) controlling the speed, at which said tape is moved, on the basis of the results of said comparison so that said predetermined length of tape has been wound around said wind-up reel at the end of said reference speed pattern.

4,977,467

MAGNETIC TAPE HIGH-SPEED BRAKING APPARATUS

Yuji Kondo, Fukaya, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Filed Mar. 29, 1989, Ser. No. 330,283

Claims priority, application Japan, Mar. 30, 1988, 63-74412

Int. Cl.[5] G11B 15/48

U.S. Cl. 360—74.1 20 Claims

11. A magnetic tape high-speed braking apparatus comprising:

tape running drive means including reel stand for rotating a reel, around which a tape is wound, in a predetermined direction;

a brake member for braking said reel stand;

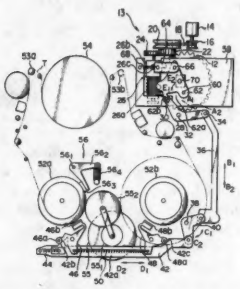
rotatable cam gear means including a first and a second cam patterns having a plurality of independent and successive cams for setting at least a high-speed mode, a stop mode and a normal-speed mode for said tape;

brake control means, which causes said brake member to be engaged with the first cam pattern of said cam gear means, for controlling whether to brake or release said reel stand in accordance with said modes;

operation mode setting means for driving said cam gear means and setting an operation mode;

discriminating means for discriminating a running state of said tape and detecting a state in which said tape is to be stopped;

a lock member having an engaging section which is engaged



with the second cam pattern of said cam gear means and driven by the rotation of said cam gear means due to the setting of said high-speed mode, for locking said brake control means in a brake release position;

drive means for driving said cam gear means when said discriminating means detects the state in which said tape is to be stopped; and

a lock release member, which is controlled by the rotation of said cam gear means, for releasing said brake control means locked by said lock member, thereby braking said reel stand by said brake means.

4,977,468

TAPE EDGE DETECTING METHOD AND DEVICE THEREFOR

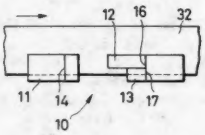
Mutsumi Aruga, Nagano, and Niro Nakamichi, Tokyo, both of Japan, assignors to Kabushiki Kaisha Sankyo Seiki Seisakusho, Nagano and Nakamichi Corporation, Tokyo, both of, Japan

Continuation of Ser. No. 106,220, Oct. 9, 1987, abandoned. This application Jan. 22, 1990, Ser. No. 465,655

Claims priority, application Japan, Oct. 9, 1986, 61-240270

Int. Cl.[5] G11B *21/10*

U.S. Cl. 360—75 **6 Claims**



3. A tape edge detecting device comprising:

a head unit including a writing head and at least two reading heads arranged in the widthwise direction of a magnetic tape, said writing head and reading heads being arranged in the direction of movement of said magnetic tape;

drive means for moving said head unit in the widthwise direction of said magnetic head;

comparison means which compares output levels of said two reading heads relative to each other to obtain a comparison output;

detecting means for detecting an edge of said magnetic tape from said comparison output, wherein said detecting means detects said tape edge on a basis of said comparison output corresponding to a comparison of the two reading heads signals relative to one another, and determines said tape edge when a level of one of said two reading head signals becomes a predetermined percentage of the other of said two reading head signals.

4,977,469

SIGNAL REPRODUCING DEVICE WHICH OFFSETS THE TRACKING ERROR SIGNAL

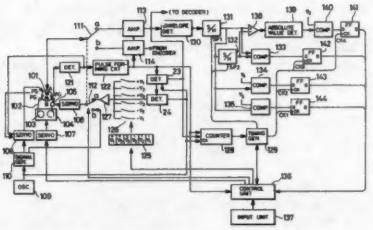
Seiichi Yokozawa, Saitama, Japan, assignor to Pioneer Electronic Corporation, Tokyo, Japan

Division of Ser. No. 169,252, Mar. 16, 1988, Pat. No. 4,947,272. This application May 2, 1990, Ser. No. 518,588

Claims priority, application Japan, Mar. 30, 1987, 62-79188; Mar. 30, 1987, 62-79189

Int. Cl.[5] G11B *5/58, 5/584*

U.S. Cl. 360—77.01 **1 Claim**



1. A signal reproducing device comprising:

a head assembly for tracing tracks on which predetermined digital data and tracking pilot signals have been recorded, said head assembly being larger in tracking width than said tracks;

first detecting circuit means for detecting a pilot signal from a reproduction output of said head assembly to form a tracking error signal;

second detecting circuit means for detecting the level of a signal reproduced by said head assembly;

a comparing means for comparing an output of said second detecting circuit means with predetermined reference values;

means for adding a predetermined offset signal to said tracking error signal according to an output of said comparing means; and

a servo circuit for controlling tracking conditions of said head assembly according to an output of said adding means.

4,977,470

TRACK-FOLLOWING CONTROL SYSTEM FOR MAGNETIC DISK DRIVE

Hiroki Murayama; Takahiko Tsujisawa, and Toshikazu Hashimoto, all of Tokyo, Japan, assignors to NEC Corporation, Tokyo, Japan

Filed Jan. 13, 1989, Ser. No. 143,489

Claims priority, application Japan, Jan. 13, 1987, 62-3987; Feb. 17, 1987, 62-32413; Jun. 16, 1987, 62-150505

Int. Cl.[5] G11B *5/596*

U.S. Cl. 360—77.040 **1 Claim**

1. A track-following control system for a magnetic disk drive, comprising:

a magnetic disk having a plurality of tracks each of which is divided into a plurality of sectors and stores not less than

one track position signal indicating a position of a track in each sector of said track;

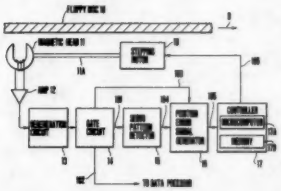
a magnetic head for writing and reading out data in and from said magnetic disk and reading out said track position signal from said magnetic disk;

position error signal generating means for generating a position error signal in numbers of sectors indicating a position error between said magnetic head and said track by using the track position signal read out by said magnetic head;

calculating and outputting means for calculating and outputting position error signals having a larger number than that of said sectors by using the position error signal supplied from said position error signal generating means; and

positioning means for positioning said magnetic head in accordance with said position error signals having the larger number than that of said sectors, wherein said positioning means performs track-following of said magnetic disk; and

wherein a single track position signal is recorded in said numbers of sectors of a single track of said magnetic disk, and said calculating and outputting means for calculating



and outputting said position error signals having the larger number than that of said sectors comprises generating and storing means for generating and storing a signal representing an estimated intra-sector position error by using an interpolation technique based on said error signals in said numbers of sectors, and

wherein said calculating and outputting means for calculating and outputting said position error signals of the number larger than that of said sectors comprises:

obtaining means for obtaining a number of terms and corresponding coefficients of an equation of an autoregressive model by using simulation and storing an obtained result, said autoregressive model being used to obtain a later position error by multiplying a previous, actual position error signal and said estimated position error obtained by interpolation by said corresponding coefficients, respectively, and adding both products; and

predicting means for predicting a future position error by multiplying said actual position error signal and said estimated intra-sector position error signal by said corresponding coefficients stored, respectively, and adding both products, and outputting a sum.

4,977,471

METHOD FOR SERVO FORMATTING DISC MEDIA FOR A FLOPPY DISK DRIVE

Anil K. Nigam, Cupertino, Calif., assignor to Fujitsu America, Inc., San Jose, Calif.

Division of Ser. No. 130,104, Dec. 7, 1987, Pat. No. 4,933,795. This application Mar. 30, 1989, Ser. No. 330,798

Int. Cl.[5] G11B *5/596, 5/012*

U.S. Cl. 360—77.08 **19 Claims**

1. A method for servo formatting disc media for a disc drive comprising the steps of:

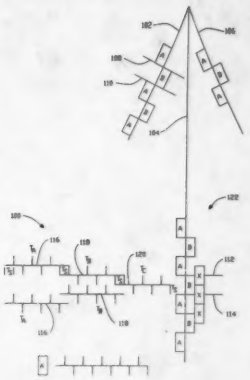
(a) establishing a plurality of data tracks on a disc media;

(b) establishing a first alignment pattern of transitions having a centerline located at a boundary of one of the data tracks;

(c) establishing a second alignment pattern of transitions having a centerline located at a boundary of another of the data tracks;

(d) establishing a first timing decode pattern of transitions that precedes the first alignment pattern of transitions, that has a centerline substantially colinear with the centerline of the first alignment pattern and located at the boundary of said one of the data tracks, which transitions of the first timing decode pattern are different from the transitions of the first and second alignment patterns;

(e) establishing a second timing decode pattern of transitions that precedes the data track, that has a centerline substantially colinear with the centerline of the data track, and



which transitions of the second timing decode pattern are different from the transitions of the first and second alignment patterns and from the transitions of the first timing decode pattern; and

(f) establishing a third timing decode pattern of transitions that precedes the second alignment pattern of transitions, that has a centerline substantially colinear with the centerline of the second alignment pattern of transitions and located at the boundary of said another of the data tracks, and which transitions of the third timing decode pattern are different from the transitions of first and second alignment patterns and from the transitions of the first and second timing decode patterns.

4,977,472

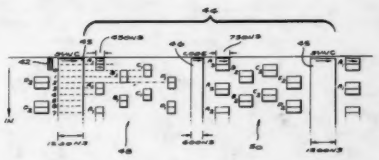
SERVO ADDRESS SYSTEM

Le Roy A. Volz, Northridge, and Mark E. Pease, Newbury Park, both of Calif., assignors to Seagate Technology, Inc., Scotts Valley, Calif.

Filed Mar. 28, 1988, Ser. No. 173,770

Int. Cl.[5] G11B *5/55, 5/596*

U.S. Cl. 360—78.140 **15 Claims**



12. A memory storage disk for a computer disk drive unit, comprising:

a dedicated servo surface on one side of said disk; and

servo data recorded onto said dedicated servo surface in a plurality of concentric tracks;

said servo data defining, for each of said tracks, a track address repeated in succession throughout said track, said track address being defined by a repeating succession of a selected plurality of bit frames each having a plurality of servo bits recorded therein in one of first and second district patterns for detection and reading in binary code.

4,977,473

DRUM ASSEMBLY IN MAGNETIC RECORDING/REPRODUCING APPARATUS AND MANUFACTURING METHOD THEREOF

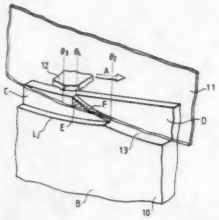
Mitsuhiro Arai; Eiichi Tsuchiya, and Tetsuo Ikeda, all of Yokohama, Japan, assignors to Victor Company of Japan, Ltd., Japan

Filed Nov. 28, 1988, Ser. No. 278,572

Claims priority, application Japan, Nov. 30, 1987, 62-301774

Int. Cl.[5] G11B *15/60, 5/027*

U.S. Cl. 360—130.24 5 Claims



1. A lower cylinder of a guide drum assembly for use in a helical scan type magnetic recording/reproducing apparatus, said guide drum assembly further including an upper cylinder having at least one magnetic head which is rotatable about its own axis and which is coaxially arranged with said lower cylinder, said magnetic head being arranged to protrude from a surface of a tape wrapping portion provided on the lower cylinder, a magnetic tape being enabled to be wrapped around said guide drum assembly in a predetermined angular range with respect to its own axis which is wider than a standard tape-wrapping angular range necessary for recording and reproducing information on and from said magnetic tape according to an industry standard system format by means of said magnetic head, thereby providing an additional tape wrapping angular range on a tape-entry portion from which said magnetic tape starts to be wrapped around said guide drum assembly, said lower cylinder integrally having on its outer circumferential surface a tape-guiding portion for guiding said magnetic tape when said magnetic tape is wrapped around said guide drum assembly, said magnetic tape being wrapped over said tape-wrapping portion along said tape guiding portion in a direction generally along a direction of rotation of said upper cylinder, a protruding portion being formed in said additional tape-wrapping angular range so as to protrude by a predetermined amount with respect to a surface of said tape-wrapping portion, so that said magnetic tape initially comes into contact with said protruding portion when the tape comes to enter into said guide drum assembly, said protruding portion including a wedge-like portion an apex of which is substantially directed in the direction of rotation of said upper cylinder and said protruding amount of said protruding portion with respect to the surface of said tape-wrapping portion being substantially equal to a protruding amount of said magnetic head from a surface of said tape wrapping portion, wherein said protruding amount of said wedge-like protruding portion is gradually made thinner in the direction of rotation of said upper cylinder so that the protruding amount of a top thereof becomes substantially zero with respect to said surface of tape-wrapping portion.

4,977,474

MAGNETIC TAPE CARTRIDGE REQUIRING UNIFORM FORCE DURING LEADER BLOCK ATTACHMENT AND DETACHMENT

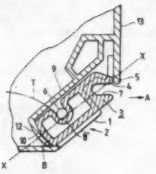
Kengo Oishi, and Seizi Odate, both of Kanagawa, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Jan. 27, 1989, Ser. No. 302,275

Claims priority, application Japan, Feb. 1, 1988, 63-11165; Feb. 1, 1988, 63-11166; Feb. 24, 1988, 63-22317

Int. Cl.[5] G11B *23/02*

U.S. Cl. 360—132 5 Claims



1. A magnetic tape cartridge, comprising:

a tape cartridge having a tape outlet at least partially defined by a partition wall an a side wall;

a tape reel rotatably disposed in said tape cartridge and having a magnetic tape wound therearound;

a leader block for securing an end of said tape and being detachably disposed in said tape outlet, said leader block having at one end thereof a curved surface for contacting a portion of said partition wall and having at another end thereof an abutting member for abutting against said side wall of said cartridge, said side wall at point of contact with said abutting member being deformable away from said abutting member to allow for attachment and detachment of said leader block, wherein a relief portion is provided on said partition wall so that when said leader block is rotated about a point of contact between said curved surface of said leader block and said portion of said partition wall so as to be attached and detached to said tape outlet, said point of contact is disposed between a longitudinal center line of said leader block and a point located toward the center of said cartridge from said center line.

4,977,475

LINING MEMBER FOR THE SURFACE OF A CASING FOR A DISC CARTRIDGE

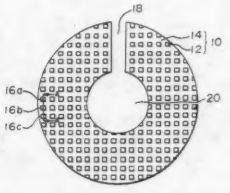
Haruo Shiba, and Masaru Ikebe, both of Komoro, Japan, assignors to TDK Corporation, Tokyo, Japan

Filed Mar. 23, 1989, Ser. No. 327,615

Claims priority, application Japan, Mar. 31, 1988, 63-43888[U]

Int. Cl.[5] G11B *23/03*

U.S. Cl. 360—133 5 Claims



1. A disk cartridge which comprises:

upper and lower half casings assembled to form a hard casing for holding a magnetic disk in the casing in a rotatable manner; and

lining members attached to inner surfaces of the upper and lower half casings, wherein one of said lining members has a laminated structure which comprises an attracting chargeable base layer for attracting dust and a net-like smooth layer and which includes rows and columns of spaced apart individual smooth layer members having a large number of apertures, which are laminated on at least one surface of the base layer.

4,977,476

SEMICONDUCTOR SWITCH

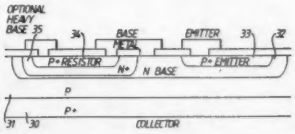
Andrew Marshall, Stevenage; Derek Colman, Bromham; Philip J. Cavanagh, Biddenham, and David P. Dale, Newport Pagnell, all of United Kingdom, assignors to Texas Instruments Incorporated, Dallas, Tex.

Filed Mar. 4, 1988, Ser. No. 164,366

Claims priority, application United Kingdom, Mar. 6, 1987, 8705328

Int. Cl.[5] H02H *7/10*

U.S. Cl. 361—18 **9 Claims**



1. A semiconductor switch device responsive to a control signal selectively to pass electric current to a load and to block the passage of electric current to the load, said semiconductor switch device comprising:

first semiconductor component means including at least one power bipolar semiconductor transistor comprising:

semiconductor substrate means of one conductivity type having top and bottom major surfaces,

a first dopant region of the other conductivity type in said semiconductor substrate means of said one conductivity type and opening onto the top surface thereof,

a second dopant region of said one conductivity type disposed in said first dopant region of the other conductivity type and opening onto the top surface thereof,

a third dopant region of the other conductivity type disposed in said first dopant region of the other conductivity type and opening onto the top surface thereof, said third dopant region of the other conductivity type having a higher dopant concentration than said first dopant region of the other conductivity type and being disposed in spaced relation to said second dopant region of said one conductivity type provided in said first dopant region of the other conductivity type,

said semiconductor substrate means of said one conductivity type and said first, second and third dopant regions defined therein forming a vertically arranged bipolar transistor having said first dopant region of the other conductivity type as the base, said second dopant region of said one conductivity type as the emitter, and the bottom portion of said substrate means as the collector and having a controlled current path extending from the top surface thereof to the bottom surface thereof, and

control input means connected to the base of said bipolar transistor and including voltage dropping means;

second semiconductor component means connected to said control input means and including means responsive to a control signal selectively to produce output drive signals applied to said control input means of said first semiconductor component means for activating said power bipolar semiconductor transistor to be conductive;

the collector of said power bipolar semiconductor transistor being adapted to be connected in series to the load; and

said power bipolar semiconductor transistor switching from a non-conductive state to a conductive state for providing electric current to the load in response to an output drive signal from said second semiconductor component means applied to said control input means.

4,977,477

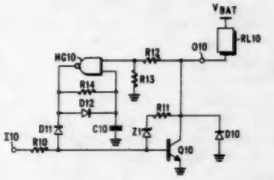
SHORT-CIRCUIT PROTECTED SWITCHED OUTPUT CIRCUIT

John Y. Babico, Wheeling, and Adelore F. Petrie, Arlington Heights, both of Ill., assignors to Motorola, Inc., Schaumburg, Ill.

Filed Aug. 3, 1989, Ser. No. 389,133

Int. Cl.[5] H02H *3/08*

U.S. Cl. 361—98 **12 Claims**



1. A short-circuit protected switched output circuit having:

an input node for receiving an input switching signal; an output node for outputting a switched output signal; switch means coupled between the input and output nodes and having a control electrode; and

oscillator means for producing a low frequency, low duty-cycle signal at the output node in the event of the output node being short-circuited, the oscillator means comprising:

a threshold sensitive NAND gate having first and second inputs and an output, the first NAND gate input being coupled to the output node, and the NAND gate output being coupled to the control electrode of the switch means;

capacitance means coupled between the second NAND gate input and a reference potential; and

diode means coupled between the second NAND gate input and the NAND gate output.

4,977,478

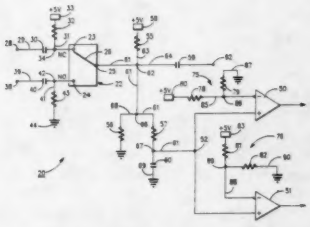
CONTACT STATUS DETECTOR

William E. Powell, Raleigh, N.C., assignor to Alcatel NA, Inc., Hickory, N.C.

Filed Apr. 7, 1989, Ser. No. 335,060

Int. Cl.[5] G01R *31/02*

U.S. Cl. 361—160 **9 Claims**



1. A relay closure detection circuit for detecting the actual status of the contacts of a relay, said circuit comprising:

A. a relay including a primary contact, a secondary contact,

and a common contact associated with a switch means movable between the primary and secondary contacts;

B. a first comparator having a first input connected to the common contact of the relay;

C. a second comparator having a first input connected to the first input of the first comparator;

D. a first reference signal source, connected to a second input of the first comparator for providing a first reference signal level thereto;

E. a second reference signal source connected to a second input of the second comparator for providing a second reference signal level less than the first reference signal level;

F. a first signal producing/enhancing circuit connected between the common contact of the relay and the first inputs of said first and second comparators for providing a first signal level thereto;

G. a second signal producing/enhancing circuit connected to the primary contact of the relay; and

H. a third signal producing/enhancing circuit connected to the secondary contact of the relay;

whereby the signal level applied to the first inputs of said comparators varies depending upon the switch means of the relay being connected to the primary contact, the secondary contact or no contact, thereby allowing the comparators to compare the signal levels received at the first inputs with the reference signals received at the second inputs of said comparators and determine the precise status of the relay.

4,977,479

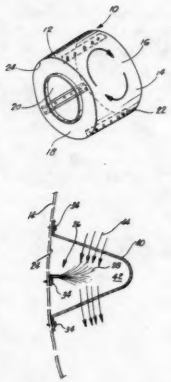
STATIC ELECTRICITY ELIMINATOR IN CLOTHES DRYERS

Rick Caroll, Post Office Box 53084, Lafayette, La. 70505

Filed Aug. 4, 1988, Ser. No. 228,534

Int. Cl.[5] H05F *3/02*

U.S. Cl. 361—220 **12 Claims**



1. Apparatus for eliminating static electricity in a clothes dryer having an inner space in which clothes are dried, the inner space being bounded by an inner surface of the dryer, the apparatus comprising:

(a) a plurality of sprays, each spray comprising a plurality of strands of conductive material;

(b) attachment means for attaching the sprays to said inner surface of the dryer; and

(c) guard means for preventing physical contact between the sprays and the clothes being dried in the dryer but allowing electrical contact between the air ih the inner space and the sprays.

4,977,480

VARIABLE-CAPACITANCE TYPE SENSOR AND VARIABLE-CAPACITANCE TYPE SENSOR SYSTEM USING THE SAME

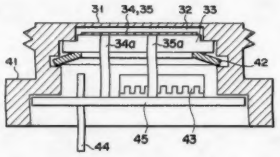
Toshihiko Nishihara, Yokohama, Japan, assignor to Fuji Koki Mfg. Co., Ltd., Tokyo, Japan

Filed Sep. 13, 1989, Ser. No. 406,960

Claims priority, application Japan, Sep. 14, 1988, 63-230983; Dec. 24, 1988, 63-326455

Int. Cl.[5] H01G *7/00*; G01L *9/12*

U.S. Cl. 361—283 **18 Claims**



18. A variable-capacitance type sensor comprising:

a planar electrode capacitor which has fixed and movable electrodes with surfaces thereof set to face each other and whose static capacitance varies according to a variation in a distance between the electrodes in a direction perpendicular to the electrodes; and

a fixed constant-capacitance capacitor serially connected to the planar electrode capacitor;

wherein capacitance of the variable-capacitance type sensor, which varies according to a pressure applied thereto, is a resultant synthesized capacitance of the static capacitance of the planar electrode capacitor and a capacitance of the constant-capacitance capacitor, thus resulting in an improved output characteristic for the variable-capacitance type sensor.

4,977,481

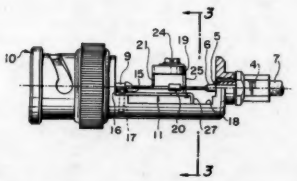
SUPPORTING DEVICE FOR A TRIMMER CONDENSER IN A CONNECTOR OF A PROBE

Kazuo Kawada, and Yuichi Oiwa, both of Higashi Murayama, Japan, assignors to Stack Electronics Co., Ltd., Akishima, Japan

Filed Dec. 28, 1989, Ser. No. 458,229

Int. Cl.[5] H01G *5/16*

U.S. Cl. 361—287 **3 Claims**



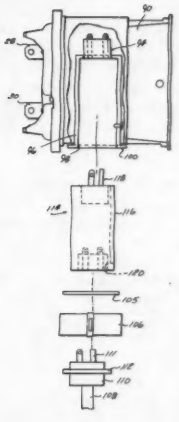
1. A supporting device for a trimmer condenser in a connector of a probe, which comprises a frame, a plate which is supported at one end portion thereof on a fixing portion a top of which is higher than a floor of a chamber for an electric parts unit of the frame and extends above the floor, and a trimmer condenser an earth terminal of which is soldered on said plate, wherein said plate has a leg on the other end portion thereof which reaches said floor.

4,977,482

WATTHOUR METER SOCKET ADAPTER WITH INTERFACE CONNECTION

Albert K. Langdon, Rochester Hills; Robert O. Learmont, Walled Lake; Darrell Robinson, Highland; Robert Goozen, St. Clair; Michael Lewis, Ann Arbor; John Williams, Holly; Allen V. Pruehs, Howell, all of Mich., and John T. Shincovich, North Canton, Ohio, assignors to Ekstrom Industries, Inc., Farmington Hills, Mich.

Filed Aug. 14, 1989, Ser. No. 393,129
Int. Cl.[5] H02B 1/00
U.S. Cl. 361—366 14 Claims



1. A watthour meter socket adapter removably mountable in a watthour meter socket having a plurality of electrical contacts and receiving the terminals of a sockettype watthour meter, and further including a first seal means for sealingly connecting the socket adapter to the watthour meter socket to control access to the watthour meter socket and the socket adapter and a second seal means for sealingly connecting a watthour meter to the socket adapter to control access to the socket-type watthour meter and the socket adapter, the socket adapter comprising:

a first housing, the first housing comprising:

a socket-type watthour meter receiving portion;

a plurality of electrical contacts mounted in the watthour meter receiving portion for removably receiving the electrical terminals of a socket-type watthour meter; and

a plurality of electrical terminals connected to the electrical contacts and extending outward from the first housing, the terminals being removably insertable within the electrical contacts of a watthour meter socket;

electrical connector means electrically connected to the contacts within the first housing for matingly receiving an electrical connector of an electrical device external to the watthour meter socket, the watthour meter socket adapter and the socket-type watthour meter;

a second housing supporting the electrical connector means; and

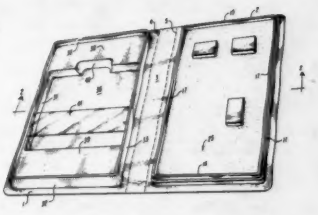
third means for separately and sealingly closing the second housing to control access to the second housing independently from access to the watthour meter socket, the watthour meter socket adapter and the socket-type watthour meter through the first and second seal means.

4,977,483

ELECTRONIC COMPONENT STORAGE ALBUM

Louis A. Perretta, P.O. Box 59, Newton Highlands, Mass. 02161

Filed May 25, 1989, Ser. No. 356,555
Int. Cl.[5] H05K 5/00
U.S. Cl. 361—424 7 Claims



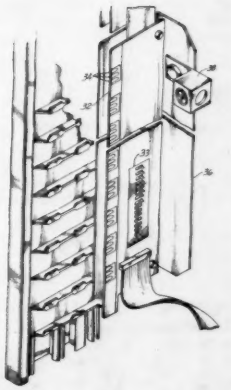
1. An electronic component storage album comprising crush resistant front and back covers, with each having integrally formed depending side walls, means for releasably securing said covers together with the side walls integral with the front cover shaped and sized to continuously engage the side walls integral with the back cover when the album is closed forming a space therebetween, and means positioned in said space to releasably engage and secure electronic components.

4,977,484

DIMMER RACK

David W. Cunningham, Los Angeles, and Gregory F. Esakoff, Huntington Beach, both of Calif., assignors to Lee Colortran Inc., Burbank, Calif.

Filed Mar. 28, 1989, Ser. No. 329,632
Int. Cl.[5] H02B 1/01
U.S. Cl. 361—429 17 Claims



1. A rack adapted for supporting a plurality of dimmer modules comprising:

a vertically elongated housing;

a plurality of module holders attached to the housing and adapted for receiving the plurality of dimmer modules stacked in a vertical file;

first electrical termination means incorporated into a first side of the housing for receiving and distributing control signals;

second electrical termination means, incorporated into said first side of the housing adjacent to said first means, for receiving and distributing input power to be controlled by the dimmer modules, and

third electrical termination means incorporated into the side of the housing opposite the first side for receiving output power from the dimmer modules and transmitting said power to a lighting load located remotely relative to the dimmer rack, said first, second and third termination means being disposed in relation to the module holders for being electrically contacted by each individual one of the dimmer modules on a plug-in basis.

4,977,485

MONOLITHIC CERAMIC CAPACITOR

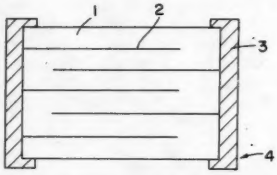
Yoshiaki Mori; Hiroshi Takagi, and Yukio Sakabe, all of Nagaokakyo, Japan, assignors to Murata Manufacturing Co., Ltd., Kyoto, Japan

Filed Jul. 10, 1989, Ser. No. 377,410

Claims priority, application Japan, Jul. 11, 1988, 63-172450

Int. Cl.[5] H01G *4/12*

U.S. Cl. 361—321 **5 Claims**



1. A monolithic ceramic capacitor which comprises a laminate composed of a plurality of dielectric ceramic layers and internal electrode layers provided between said dielectric ceramic layers, and external electrodes provided at both ends of said laminate and electrically connected to said internal electrode layers, said dielectric ceramic layer being a dielectric ceramic containing lead oxide and a reduction inhibitor and said internal electrode layer being copper or a copper alloy and, wherein the reduction inhibitor is a material having the composition represented by the general formula:

$$d(MnO_2+RO)+(1-d)(B_2O_3+SiO_2)$$

$$e(ZnO+RO+(1-e)(B_2O_3+SiO_2), \text{ or}$$

$$aLi_2O+bRO+cB_2O_3+(1-a-b-c)SiO_2$$

wherein RO is at least one component selected from the group consisting of MgO, CaO, SrO and BaO, and a, b, c, d and e are constants, respectively.

4,977,486

ILLUMINATING DISPLAY DEVICE

Masaki Gotoh, Sendai, Japan, assignor to Alps Electric Co., Ltd., Tokyo, Japan

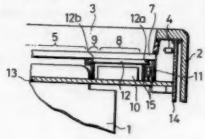
Filed Dec. 27, 1989, Ser. No. 457,907

Claims priority, application Japan, Apr. 25, 1989, 1-47696[U]

Int. Cl.[5] G01D *11/28*

U.S. Cl. 362—27 **3 Claims**

1. In an illuminating display device wherein a first light source is capable of illuminating a first display area and is positioned opposite to said first display area and wherein a second light source is capable of illuminating a second display area through a light guiding means, said first light source and said second light source arranged at a rear side of a display panel having said first display area and said second display area arranged therein, an improvement in which a transparent flat plate-like light guiding member for guiding light from said second light source to said second display area is placed between said display panel and said first light source, wherein the light from said second light source is reflected by a first tapered surface arranged at one end of said light guiding member



and guided to said second display area by a second tapered surface arranged at the other end of said light guiding member and wherein at the same time said light guiding member allows the light of said first light source to pass through said light guiding member in a plate thickness direction.

4,977,487

FACE BRIGHTENING DEVICE FOR USE WITH VEHICLES

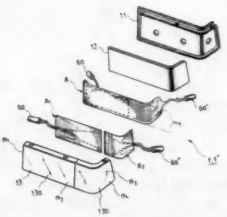
Susumu Okano, Aichi, Japan, assignor to Sakae Riken Kogyo Co., Ltd., Aichi, Japan

Filed Oct. 7, 1988, Ser. No. 254,819

Claims priority, application Japan, Oct. 9, 1987, 62-256085; Nov. 9, 1987, 62-171144[U]; Nov. 9, 1987, 62-171145[U]; Nov. 10, 1987, 62-171715[U]; Nov. 10, 1987, 62-171716[U]

Int. Cl.[5] F21V *7/04*

U.S. Cl. 362—32 **12 Claims**



1. A face brightening device for use with vehicles wherein a plurality of transparent optical fibers are: arranged side by side in a certain width; fixed together on a base film of synthetic resin to form a flat area and notched at their flat area to form light-emitting portions which represent letters, patterns or the like; and bundled together at both ends thereof with the bundled ends each connected to a light source.

4,977,488

SOLAR POWERED OUTDOOR RECREATIONAL LIGHT WITH POSITIONABLE SOLAR PANEL

James C. Spotts, Kowloon, and Haw R. Chai, Hong Kong, both of Hong Kong, assignors to Australux North America Ltd., Kowloon, Hong Kong

Filed Mar. 14, 1990, Ser. No. 493,216

Int. Cl.[5] F21L *11/00*

U.S. Cl. 362—183 **9 Claims**

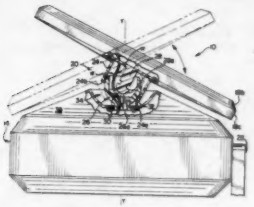
1. A solar powered outdoor recreational light comprising:

a housing;

a lamp operatively associated with the housing;

a solar panel for collecting sun light and producing electricity for the lamp, the solar panel having sides and a center of gravity; and,

a joint connected to said solar panel proximate said center of gravity and to said housing so that the solar panel may



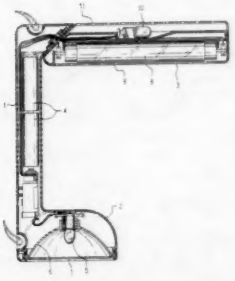
rotate relative to said housing and any side of said panel may move vertically relative to said housing.

4,977,489

PORTABLE BATTERY OPERATED LIGHTING DEVICE

Shiu P. Fung, Kwai Chung, Hong Kong, assignor to Fatia Industrial Co., Ltd., Kwai Chung, Hong Kong

Filed Dec. 14, 1989, Ser. No. 450,436
Int. Cl.[5] F21L *11/00*
U.S. Cl. 362—184 7 Claims



1. A portable battery operated lighting device capable of being operated in more than one mode, comprising:

a first elongated housing for receiving a battery;

a second housing fixedly connected to one end of said first housing and including a first light source for producing a beam of light, said second housing being capable of acting as a base on which said device may stand; and

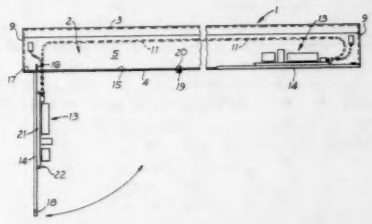
a third housing including a second light source different from the first light source, said third housing being pivotally connected by means of a pivot joint to the other end of said first housing so as to be movable between two different positions, a first position in which said third housing lies parallel to and side by side with said first housing so that together said first and third housings form a handle which, with said first light source switched on, allows said device to be used in a first mode as a hand-held flashlight, and a second position in which said third housing is at an angle to said first housing which, with said second light source switched on and said device standing on said second housing, allows said device to be used in a second mode as a free standing light.

4,977,490

FLUORESCENT LIGHT FITTING AND SYSTEM

John H. Davies, Rotherham, England, assignor to Fifth Generation Technology (Manufacturing) Ltd., Rotherham, England

Filed Feb. 27, 1989, Ser. No. 315,598
Claims priority, application United Kingdom, Feb. 27, 1988, 8804636
Int. Cl.[5] F21S *3/00*; F21V *21/00*
U.S. Cl. 362—221 12 Claims



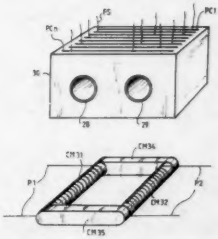
1. A fluorescent light fitting comprising an elongate metal casing of hollow cross-section comprising an upper wall, a pair of spaced-apart sidewalls spacing said upper wall from a lower wall parallel to said upper wall, spaced-apart fluorescent tube holders projecting from an external surface of each of said sidewalls, said sidewalls being angled downwardly to define an acute angle, a movable baseplate provided on said lower wall, electrical control components mounted on said baseplate, and fastening means to fasten and release said baseplate to its wall, with said components normally located internally of said casing when said baseplate is in its fastened position, and with said components temporarily exposed for servicing when said baseplate is released, and with said electrical components carried indirectly by said baseplate, being mounted on an exchangeable gear tray, in turn releasably attached to said baseplate.

4,977,491

HIGH FREQUENCY TRANSFORMER WITH A PRINTED CIRCUIT WINDING IN PARTICULAR FOR A VERY HIGH VOLTAGE POWER SUPPLY

Jean-Pierre Domenget, Garches, and Gérard Lorec, Bourg La Reine, both of France, assignors to Electronique Serge Dassault, France

Continuation of Ser. No. 76,356, Jul. 22, 1987, abandoned. This application Nov. 18, 1988, Ser. No. 273,666
Claims priority, application France, Oct. 15, 1986, 86 14336
Int. Cl.[5] H02M *3/00*; H01F *27/30*
U.S. Cl. 363—15 19 Claims



1. A high frequency transformer comprising:

(a) a magnetic circuit including at least two generally parallel cores connected by polar pieces;

(b) at least one primary winding wound directly on one of said two parallel cores;

(c) means for driving said primary winding;

(d) a plurality of separate secondary windings magnetically coupled to said primary winding to generate output voltages and comprising flat conductors deposited on an insulating substrate, said insulating substrate carrying two of said secondary windings, each one of said two of said secondary windings being disposed respectively and generally perpendicularly to and around a respective one of said two parallel cores;

(e) electrical circuit means coupled to said secondary windings for providing an output voltage in response to driving of said primary winding; and

(f) a resin block uniting the secondary windings and extending around the cores with a cross-section corresponding to the dimensions of the parallel cores of the magnetic circuit fitted with the primary winding.

4,977,492

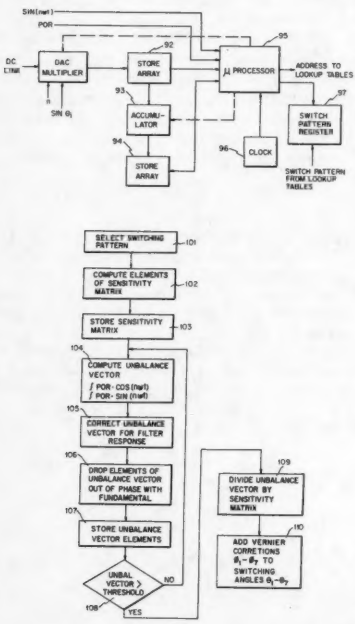
SUPPRESSION OF SWITCHING HARMONICS

Maurice A. Kirchberg, Jr., Dubuque, Iowa, and Alexander Cook, Rockford, Ill., assignors to Sundstrand Corporation, Rockford, Ill.

Filed Apr. 25, 1990, Ser. No. 514,674

Int. Cl.[5] H02M *1/12*

U.S. Cl. 363—41 **4 Claims**



1. A controller for an inverter of the type including a source of d.c. voltage, inverter switches controlled by the controller to chop said d.c. voltage to generate a pulse width modulated pattern, and a filter for smoothing the pulse width modulated pattern to produce a generally sinusoidal output, said controller selecting from a plurality of stored switching angle sets an initial switching angle set for controlling said inverter switches based on sensed parameters at an output of said inverter, comprising:

means for adjusting individual ones of said switching angles to control harmonics through the Nth harmonic in the inverter output;

means for inserting a signal on said source of d.c. voltage to control at least one harmonic higher than said Nth harmonic.

4,977,493

EFFICIENT SNUBBER FOR RECTIFIER CIRCUITS

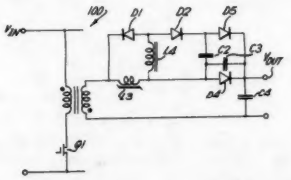
David A. Smith, Kowloon, Hong Kong, assignor to ASTEC International Limited, Hong Kong

Filed Jul. 13, 1989, Ser. No. 379,380

Claims priority, application United Kingdom, Jul. 14, 1988, 8816774

Int. Cl.[5] H02M *7/06*

U.S. Cl. 363—126 **14 Claims**



1. A rectifier circuit comprising a rectifier intended to allow current to flow in a forward direction to an output, a saturable inductor allowing the ready passage of current in the forward direction but blocking reverse recovery rectifier current, inductor means through which reverse recovery rectifier current passes and for limiting that reverse recovery current, energy stored in those inductor means being used to re-set the saturable inductor to its saturation state for a subsequent flow of current in the forward direction, capacitor means for absorbing surplus energy from the inductor means, and rectifier means for guiding that surplus energy to the output.

4,977,494

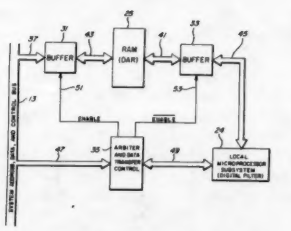
HIGH SPEED DIGITAL MOTION CONTROLLER ARCHITECTURE

John B. Gabaldon, San Diego, and Daniel D. Evans, Jr., Oceanside, both of Calif., assignors to Hughes Aircraft Company, Los Angeles, Calif.

Filed Feb. 17, 1989, Ser. No. 312,105

Int. Cl.[5] G05B *11/00*; G11C *13/00*

U.S. Cl. 364—167.01 **20 Claims**



1. A digital architecture for a motion controller comprising:

a system bus for supplying path data, said path data including a plurality of subsets of path data, each subset corresponding to a desired trajectory of a selected dimension of motion;

a plurality of digital processor means, one for each dimension of motion, each processor means for computing a control signal for its dimension of motion utilizing the subset of path data corresponding thereto;

a plurality of memory means, each connected to said system bus and to a respective one of said plurality of digital processor means for receiving and storing the corresponding subset of said path data from said bus and for storing data transferred to and from the connected processor;

a plurality of control means, one connected to each of said memory means, for receiving control signals from said system bus and from said respective one of said plurality of digital processor means connected to the memory means, for controlling access to the connected memory means in response to said control signals;

wherein each said memory means comprises:

a random access memory means for storing said corresponding subset of path data;

a first gating buffer means responsive to a first buffer gating control signal for gating said subset of path data between said system bus and said random access memory means; and

a second gating buffer means responsive to a second buffer gating control signal for gating said subset of path data between said respective one of said digital processor means and said random access memory means;

wherein each said control means comprises:

means responsive to a first request for access received over said system bus to generate a first access grant control signal and to a second request for access received from said respective one of said digital processor means to generate a second access grant control signal; and

sequencer means responsive to said first access grant control signal to generate said first buffer gating control signal and to said second access grant control signal to generate said second buffer gating control signal;

wherein said means responsive to a request for access comprises a state machine means for occupying a first state and a second state, said first state being entered in response to a said second request for access, the second state being entered in response to a said first request for access;

said architecture further including a first clock means producing a succession of clock edges and wherein said state machine means runs in response to said succession of clock edges and generates said second access grant signal at a first edge of said clock; and wherein said sequencer means enables said second gating buffer means and said random access memory means and causes completion of data transfer between said respective one of said digital processor means and said random access memory means upon occurrence of the next clock edge in said succession after said first clock edge;

said architecture further including second clock means for driving said respective one of said digital processor means, the clock rate of said first clock means being selected to be higher than that of said second clock means and such that a data transfer is achieved between said respective one of said digital processor means and said random access memory means before said digital processor means is capable of raising another said second request for access.

4,977,495

SYSTEM AND METHOD FOR ACCESSING A CACHE MEMORY WHICH IS LOCATED IN THE MAIN MEMORY OF A LARGE DATA PROCESSING SYSTEM

William Stratton, Malvern, and Carol Wellington, Berwyn, both of Pa., assignors to Unisys Corporation, Detroit, Mich.

Filed Feb. 29, 1988, Ser. No. 162,396

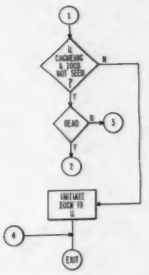
Int. Cl.[5] G06F *13/14*

U.S. Cl. 364—200 **9 Claims**

1. In a data processing system having an operating system, a plurality of disk drives for storing data segments in a plurality of tracks, at least one central processor, and a main memory having a first portion for storing said operating system along with a plurality of tasks to be executed by said at least one central processor which processes require I/O disk drive operations to occur before their execution can be completed, said I/O disk drive operations including a read I/O operation and a write I/O operation for reading and writing data segments on said disk drives, the improvement comprising:

programmable means for setting aside a second portion of said main memory as a disk cache area of controllable size for use by a task;

means providing a software system as part of said operating system, said software system being adapted to control the operation of said disk cache area;



said software system being operable to initiate an I/O operation when a task being executed by said central processor requests an I/O disk drive operation;

said software system being operable in response to a task requesting a read I/O operation to search said disc cache area to determine if the requested data segment is stored therein and, if so, to provide the requested data segment to the requested task therefrom and, if not, to fetch the requested data segment from said disc drive for storage in said disc cache area, said software system terminating the I/O operation when it is completed.

4,977,496

BRANCHING CONTROL SYSTEM

Katsumi Onishi, and Yuto Ono, both of Kawasaki, Japan, assignors to Fujitsu Limited, Kawasaki, Japan

PCT No. PCT/JP84/00536, § 371 Date Jun. 25, 1985, § 102(e) Date Jun. 25, 1985, PCT Pub. No. WO85/02280, PCT Pub. Date May 23, 1985

PCT Filed Nov. 8, 1984, Ser. No. 752,190

Claims priority, application Japan, Nov. 16, 1983, 58-215196

Int. Cl.[5] G06F *7/00*

U.S. Cl. 364—200 **16 Claims**

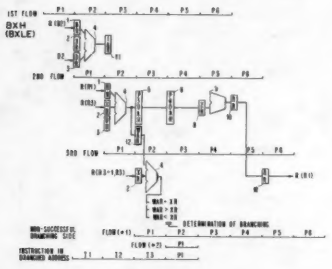
1. A branching control system for controlling branching based upon a branching condition in a data processing unit that fetches instructions in an instruction pipeline and processes instructions in multiple passes through a hardware operation pipeline which includes a first cycle for performing instruction decoding and selection of general purpose registers, a second cycle for calculating addresses and generating memory access requests, a third cycle for performing further address calculations, and subsequent cycles, said data processing unit processing a branching instruction which includes a plurality of fields, one of which represents a displacement and other of which designate an increment, a comparison number, a base and an index, said branching control system comprising:

adding means, operative during a second cycle of a first pass through the hardware operation pipeline, for adding the

base and displacement to calculate a branching address from a branching instruction which was decoded during a first cycle of the first pass;

fetch means, operative during third and subsequent cycles of the first pass through the hardware operation pipeline, for fetching an instruction designated by the branching address calculated by said adding means; and

said adding means, operative during a second cycle of a second pass through the hardware operation pipeline which corresponds to a third cycle of the first pass, for



adding the index to the increment to produce a result and, operative during a second cycle of a third pass through the hardware operation pipeline which corresponds to a third cycle of the second pass, for comparing the result with the comparison number to produce the branching condition;

whereby the branching condition is determined during a vacant cycle of address calculation corresponding to a third cycle of the second pass through the hardware operation pipeline.

4,977,497

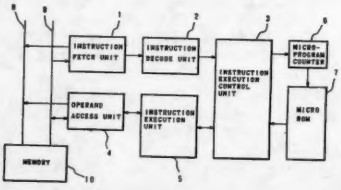
DATA PROCESSOR

Ken Sakamura, Tokyo; Toru Suimizu, Itami; Shunichi Iwata, Itami, and Tatsuya Enomoto, Itami, all of Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Division of Ser. No. 172,041, Mar. 23, 1988. This application Oct. 10, 1989, Ser. No. 419,350

Int. Cl.[5] G06F *1/00*

U.S. Cl. 364—200 **3 Claims**



1. A data processing system that executes a bit processing instruction which specifies arbitrary starting and ending bit positions of a bit string in memory and the processing to be executed on the bit string comprising:

a data bus of a predetermined width coupled to a memory for transferring aligned words of said predetermined width to and from said memory;

means, coupled to said data bus, for accessing, only once, every aligned word comprising bits included in the bit string to be processed when the length of the bit string is greater than the predetermined width;

means for executing the processing specified by the instruction on only the bits in said accessed words that are included in said bit string.

4,977,498

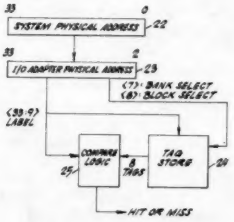
DATA PROCESSING SYSTEM HAVING A DATA MEMORY INTERLOCK COHERENCY SCHEME

Joseph Rastegar, Newton, and Anne S. Valiton, Westboro, both of Mass., assignors to Digital Equipment Corporation, Maynard, Mass.

Filed Apr. 1, 1988, Ser. No. 176,785

Int. Cl.[5] G06F *12/12, 12/14*

U.S. Cl. 364—200 **13 Claims**



7. A data processing system comprising:

(a) a device having a set-associative cache memory structure and a first pointer system to track set locations in said set-associative cache memory structure that are available for replacement, said first pointer system indicating a next available set location;

(b) a memory controller coupled to said device and having a second pointer system to independently track said set locations available for replacement in said set-associative cache memory structure, the second pointer system pointing to said next available set location;

(c) said device including means for indicating a lock status for a preselected set location within said set-associative cache memory structure;

(d) said device including means for incrementing said first pointer system to another next available set location within said set-associative cache memory structure when said next available set location pointed to by said first pointer system is said first preselected set location;

(e) said memory controller including means for incrementing said second pointer system to said another next available set location within said memory controller, subsequent to said incrementing of said first pointer system, the means comprising:

(i) means for receiving a data transfer command from said device, said data transfer command including a memory address to a data block stored in said another next available set location;

(ii) a tag store in said memory controller for storing a corresponding memory address for a respective data block stored in each set location in said set-associative cache memory structure;

(iii) means for comparing said memory address in said data transfer command and a memory address in said tag store corresponding to said next available set location; and

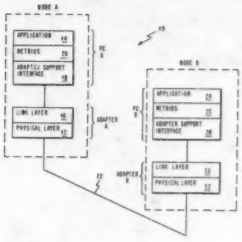
(iv) means for incrementing said second pointer system to said another next available set location within said memory controller when said means for comparing indicates a mismatch.

4,977,499

METHOD AND APPARATUS FOR COMMANDING OPERATIONS ON A COMPUTER NETWORK

William L. Banning, Austin, Tex., and Harrison D. Ingles, Jr., Cary, N.C., assignors to International Business Machines Corp., Armonk, N.Y.

Filed Apr. 8, 1988, Ser. No. 179,182
Int. Cl.[5] G06F *1/00*
U.S. Cl. 364—200 12 Claims



1. A system comprising two or more computers, equipped with application programming and connected in a network for intercommunication, comprising:

a. a plurality of nodes with each node including one said computer and a network adapter;

b. multiple levels of interface software in each node, providing command functions and including means for processing messages initiated at the computer of the node for transmission to another computer in the network;

c. link software as part of said interface software for communicating with the corresponding adapter;

d. means connecting said nodes in the network configuration through said adapters;

e. means, as part of each network adapter, for effecting transmission of messages from one node to another node in said network; and

f. means as part of said interface software for completing a message transmission command without waiting for acknowledgment from a node to which the message was transmitted, above the level of said link software.

4,977,500

SYSTEM RECOVERY METHOD FOR COMPUTER SYSTEM HAVING A STANDBY SYSTEM WITH A WAIT JOB OPERATION CAPABILITY

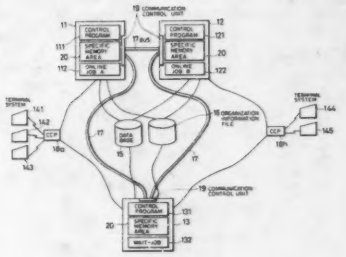
Hiromichi Ogata, Fujisawa, and Youichi Yamamoto, Kawasaki, both of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Sep. 16, 1987, Ser. No. 97,123
Claims priority, application Japan, Sep. 9, 1986, 62-219542
Int. Cl.[5] G06F *11/16*
U.S. Cl. 364—200 4 Claims

1. In a computer system wherein a plurality of processors are disposed, a plurality of jobs which have a system organization differing from one another respectively perform similar processes, and organization information items which are referred to by respective ones of the plurality of jobs and which express a system organization for the processes performed by the jobs are provided, a system recovery method comprising the steps of:

providing a wait job which is executed by one of said plurality of processors and which waits in an executable state, and wait-job organization information which is referred to by said wait job and which is a logical sum of said organization information items referred to by said respective ones of the plurality of jobs;

responding to detection of a failure of one of said plurality of jobs to retain as valid only the organization information items which are expressive of system architecture of the detected failed job within said wait-job organization information, the failure preventing the detected failed job from performing a process which was to be performed by the detected failed job; and



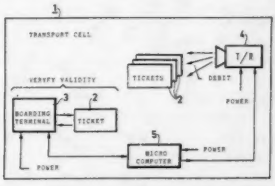
causing said wait job to perform the process which was to be performed by the detected failed job.

4,977,501

FARE COLLECTION SYSTEM USING MICROWAVES

Jean Patrick Lefevre, Palaiseau, France, assignor to Societe Anonyme dite: Compagnie Generale d'Automatisme CGA-HBS, Paris, France

Filed Feb. 14, 1989, Ser. No. 310,267
Claims priority, application France, Feb. 22, 1988, 88 02084
Int. Cl.[5] G06F *15/21*
U.S. Cl. 364—401 7 Claims



1. A payment system for the users of transport means for transporting passengers, said transport means having at least one transport cell for carrying at least one passenger, said transport cell having a user boarding passage through which a user passes during boarding, the system comprising a ticket for each user, and including the improvement wherein each transport cell includes transmitter equipment, a microcomputer, and a boarding terminal including transmitter/receiver means for transmitting and receiving signals, said transmitter/receiver means being located on the user boarding passage, the microcomputer being connected to said transmitter equipment and to said boarding terminal, and said ticket containing a data processing member including a memory and ticket transmitter/receiver means for transmitting and receiving signals, said system further including means for interchanging information between the ticket and both the transmitter equipment and the boarding terminal by means of electromagnetic signals.

4,977,502

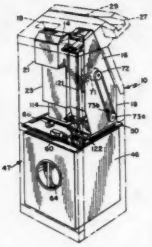
TRANSIT VEHICLE FAREBOX FOR CONDUCTING MULTI-MEDIA TRANSIT FARE TRANSACTIONS

Joseph R. Baker, San Diego; Wesley A. Golland, La Jolla; Paul A. Mullens; Roger B. Trimble, and Charles W. Giebelhausen, of San Diego, all of Calif.

Continuation of Ser. No. 750,534, Jun. 28, 1985. This application Oct. 29, 1987, Ser. No. 114,565

Int. Cl.[5] G06F *15/21*

U.S. Cl. 364—405 19 Claims



10. A multi fare media farebox, comprising:

a housing with upper and lower portions and a fixed barrier separating said upper and lower portions, said barrier including passageway means for connecting said upper and lower portions;

bill means removably seated in said upper portion for receiving and determining the denomination of a currency bill or fare ticket and for conveying currency bills and fare tickets to said passageway means;

coin means in said upper portion for receiving and determining the denomination of a coin or token and for conveying coins and tokens to said passageway means;

magnetic farecard processor means in said upper portion for receiving a magnetically encoded farecard and recognizing fare information encoded thereon;

portable cashbox means releasably held in said lower portion and communicating with said passageway means for receiving currency bills, fare tickets, coins or tokens therefrom;

security means in said housing upper portion for blocking said passageway means to restrict unauthorized access to said lower portion in response to removal of said bill means from said housing upper portion; and

fare processing means in said housing for determining payment of a fare based upon determination of the denomination of a currency bill, fare ticket, coin, or token or recognition of predetermined encoded fare information.

4,977,503

ELECTRONIC SPORTS INFORMATION RETRIEVAL DEVICE

Paul J. Rudnick, Castro Valley; Paul M. Toldalagi, Danville, and Harlan Neff, Castro Valley, all of Calif., assignors to Psicom Sports Incorporated, Dublin, Calif.

Continuation-in-part of Ser. No. 158,193, Feb. 19, 1988, Pat. No. 4,890,229. This application Oct. 18, 1988, Ser. No. 259,160

The portion of the term of this patent subsequent to Dec. 26, 2006, has been disclaimed.

Int. Cl.[5] G06F *15/40*

U.S. Cl. 364—410 3 Claims

1. A hand-held portable electronic apparatus for providing a user with sports information on demand, comprising:

means for storing a compressed database comprising historical and statistical data for sports players and teams, said database including for each player a header record and cumulative and yearly statistical records;

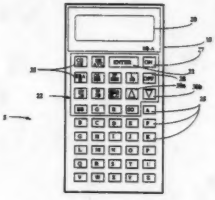
a display device for providing a visual display to allow the user to view selected data;

a keyboard having a set of alphabet keys, an ENTER key, at least one cursor key, and a plurality of selection keys, said selection keys corresponding to types of information capable of being selected for display on said display device; and

a programmed microcomputer having

means, responsive to a sequence of alphabet keys, for creating a pointer to the closest header record,

means, responsive to said ENTER key, for causing the



header information pointed to by said pointer to be displayed,

means, responsive to said at least one cursor key and operable when said header information is being displayed, for causing neighboring header information to be displayed,

means, responsive to said selection keys and operable when header information is being displayed, for causing a statistical record to be displayed, and

means, responsive to said at least one cursor key and operable when a statistic is being displayed, for causing the same statistic for additional years to be displayed.

4,977,504

METHOD FOR DETERMINING DESIRED IMAGE SIGNAL RANGES AND METHOD FOR DETERMINING IMAGE REGIONS

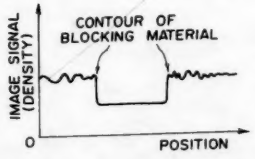
Takeshi Funahashi, Kanagawa, Japan, assignor to Fuji Photo Film Co., Ltd., Kanagawa, Japan

Filed Sep. 19, 1989, Ser. No. 409,199

Claims priority, application Japan, Sep. 19, 1988, 63-233985; Sep. 19, 1988, 63-233986

Int. Cl.[5] G01N *23/04*

U.S. Cl. 364—413.13 14 Claims



1. A method for determining a desired image region on a recording medium having a radiation image of an object recorded thereon together with an image of a radiation blocking material, which image region substantially carries only a desired image part outside of the image part corresponding to the radiation blocking material,

the method for determining a desired image region comprising the steps of:

(i) carrying out an image read-out operation from said recording medium in order to obtain an image signal,

(ii) carrying out differentiation processing on image signal components of said image signal corresponding to positions located along each of a plurality of lines on said recording medium, which lines include lines extending across the image part corresponding to said radiation blocking material,

(iii) finding the absolute values among the values resulting from the carrying out of differentiation processing on said image signal components, which absolute values exceed a predetermined threshold value,

(iv) dividing the area of said recording medium into a plurality of small blocks, and finding the degree of occurrence with which the points on said recording medium associated with the absolute values exceeding said threshold value occur in each of said small blocks, and

(v) determining a group of the small blocks, in which the degrees of occurrence of said points are not higher than a predetermined degree, as said desired image region.

4,977,505

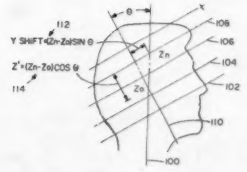
MEANS TO CORRELATE IMAGES FROM SCANS TAKEN AT DIFFERENT TIMES INCLUDING MEANS TO DETERMINE THE MINIMUM DISTANCES BETWEEN A PATIENT ANATOMICAL CONTOUR AND A CORRELATING SURFACE

Charles A. Pelizzari, Western Springs, and George T. Y. Chen, Winnetka, both of Ill., assignors to Arch Development Corporation and The University of Chicago, both of Chicago, Ill.

Filed May 24, 1988, Ser. No. 198,043

Int. Cl.[5] G06F *15/42*

U.S. Cl. 364—413.19 **8 Claims**



1. A method for creating a composite image from disparate sets of tomographic image slices, the method comprising:

creating a "head" from one set of tomographic image slices, said head comprising a three dimensional stack of contours of said one set of slices;

creating a "hat" from another set of said tomographic image slices, said hat comprising a plurality of points with coordinate positions which define a three dimensional surface of a stack of said image slices;

superimposing said hat on said head;

determining from side and top planar views of said hat and head, a function which defines the mean distance of said hat points from said head contours; and

adjusting the relative position of said hat on said head until said function is found to be a minimum.

4,977,506

SUSPENSION CONTROL APPARATUS FOR AN AUTOMOTIVE VEHICLE

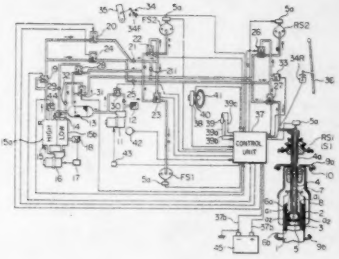
Mitsuhiko Hara; Shozo Takizawa; Tadao Tanaka; Yasutaka Taniguchi, all of Okazaki; Shunichi Wada, and Shigeki Ohtagaki, both of Himeji, all of Japan, assignors to Mitsubishi Jidosha Kogyo Kabushiki Kaisha and Mitsubishi Denki Kabushiki Kaisha, both of Tokyo, Japan

Filed Oct. 17, 1988, Ser. No. 258,410

Claims priority, application Japan, Oct. 15, 1987, 62-262555

Int. Cl.[5] B60G *17/00*

U.S. Cl. 364—424.05 **2 Claims**



1. A suspension control apparatus for an automotive vehicle comprising:

a plurality of suspension units which are disposed between each of the wheels of a vehicle and a body of the vehicle and which each support the vehicle body with respect to a corresponding wheel;

a plurality of actuators for controlling the characteristics of said suspension units;

acceleration detecting means for detecting the acceleration of the vehicle and producing a corresponding output signal, said acceleration detecting means being supported by and electrically insulated from the vehicle body, said acceleration detecting means having a ground circuit, said acceleration detecting means comprising an electrically conducting housing and an electrically insulating member through which said housing is secured to said body of the vehicle, said ground circuit being grounded on said housing;

control means for calculating changes in the attitude of the vehicle based on at least the output signal of said acceleration detecting means, and based on the calculated attitude changes, controlling said actuators so as to suppress changes in attitude of the vehicle body, said control means having a ground circuit; and

a ground wire separate from a chassis of said vehicle which connects the ground circuit of said control means directly with the ground circuit of said acceleration detecting means so that the two ground circuits are at the same potential independently of any deviation of a potential of said ground circuit of said control means from a power supply ground potential of said vehicle.

4,977,507

MOTOR-DRIVEN POWER STEERING CONTROL APPARATUS

Hirofumi Matsuoka, and Hidetoshi Tabuse, both of Osaka, Japan, assignors to Koyo Seiko Co., Ltd., Osaka, Japan

Filed Aug. 28, 1989, Ser. No. 399,722

Claims priority, application Japan, Sep. 6, 1988, 63-222895; Feb. 28, 1989, 1-49340

Int. Cl.[5] B62D *5/04*

U.S. Cl. 364—424.05 **6 Claims**

4. An apparatus for detecting an overload on an electric

motor used to assist steering force in a motor-driven power assisted steering control system, comprising,

means for detecting voltage of power source for driving said electric motor;

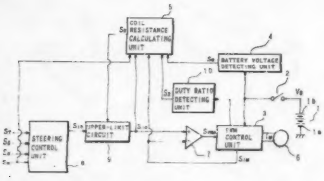
driving control means for driving said electric motor by pulse width modulated voltage;

means for detecting duty ratio of voltage to be given to said electric motor from said driving control means;

means for detecting driving current of said electric motor;

means for detecting number of revolutions of said electric motor;

means for calculating effective voltage of said electric motor on the basis of the detected voltage and the duty ratio;



counter-electromotive force calculating means for calculating a counter-electromotive force of said electric motor on the basis of the detected number of revolutions;

resistance calculating means for calculating coil resistance of said electric motor by using the detected driving current, calculated effective voltage, and the calculated counter-electromotive force; and

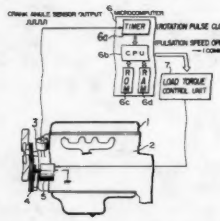
temperature calculating means for calculating temperature of the electric motor on the basis of the calculated coil resistance wherein the calculated temperature is interrupted to determine whether said overload exists; and electric current control means for reducing said driving current of said electric motor when the calculated temperature reaches a predetermined value indicative of the existence of said overload.

4,977,508

INTERNAL COMBUSTION ENGINE EQUIPPED WITH A TORQUE CONTROLLER

Naoyuki Tanaka, Abiko; Yozo Nakamura, Ibaraki; Akira Arai, Ibaraki; Mitsuru Nakamura, Ibaraki; Tsunehiro Endo, Hitachiota, and Yuzo Kadomukai, Ibaraki, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Nov. 13, 1986, Ser. No. 929,912
Claims priority, application Japan, Jun. 27, 1986, 61-149524
Int. Cl.[5] F02D 29/06; F02B 75/06
U.S. Cl. 364—431.08 15 Claims



1. A torque controller apparatus for an internal combustion engine which includes a main power transmission system and an auxiliary machinery drive transmission, said engine produces a varying torque on a crank shaft connected between said main power transmission and said auxiliary machinery drive transmission, said crank shaft rotates through a plurality of crankangles, said torque controller apparatus comprising:

varying torque detecting means for detecting said varying torque at each crankangle of said crankshaft and supplying a varying torque signal;

differential torque calculating means for calculating a differential torque by subtracting said varying torque signal from an average value of said varying torque signal and supplying a differential torque signal, said average value of said varying torque signal being obtained by averaging data representative of varying torque signals collected over a plurality of previous cycles of said engine;

load torque determining means for determining a load torque absorbed by said auxiliary machinery at each crankangle of said crank shaft by adding said differential torque signal to an average load torque absorbed by said auxiliary machine and supplying a load torque signal; and

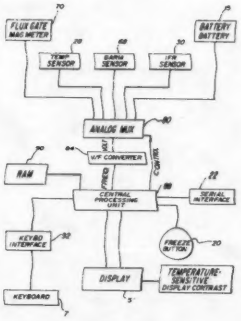
load torque controller means for controlling said load torque absorbed by said auxiliary machinery at each crankangle of said crankshaft in response to said load torque signal.

4,977,509

PERSONAL MULTI-PURPOSE NAVIGATIONAL APPARATUS AND METHOD FOR OPERATION THEREOF

Gary Pitchford, Phoenix; Steve Pitchford, Mesa, both of Ariz., and Paul Hyde, Pleasant Hills, Calif., assignors to Campsport, Inc., Phoenix, Ariz.

Continuation-in-part of Ser. No. 281,734, Dec. 9, 1988, abandoned. This application May 30, 1989, Ser. No. 357,843
Int. Cl.[5] G06F 15/50
U.S. Cl. 364—449 37 Claims



1. A multi-purpose navigational apparatus, comprising:

a temperature sensor means for sensing the temperature of the surrounding area of said navigational apparatus;

a barometric sensor means for sensing the barometric pressure of the surrounding area of said navigational apparatus;

an infrared sensor means for sensing, in the surrounding area of said navigational apparatus, bodies exhibiting heat;

a magnetometer means for determining navigational information;

a microprocessor means for receiving, processing, and outputting information directly from said temperature sensor means, barometric sensor means, infrared sensor means and magnetometer means, and for storing said information;

keyboard means operably coupled to said microprocessor means for communicating by a user with said microprocessor means;

display means operably coupled to said microprocessor means for displaying at least one of information processed

through said microprocessor means, said information being at least one of said information for determining at least a location of a user of said apparatus, said information being information from at least one of said temperature sensor means, barometric sensor means, and infrared sensor means for determining at least an environmental condition surrounding said user;

a power source means for providing power to said navigational apparatus; and

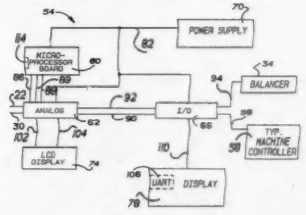
upper and lower casings for housing said temperature sensor means, barometric sensor means, infrared sensor means, magnetometer means, microprocessor means, keyboard means, display means, and power source means.

4,977,510

COMPUTERIZED CONTROL SYSTEM AND METHOD FOR BALANCERS

Wayne L. Winzenz, Manchester, and Brian K. Hackett, Saline, both of Mich., assignors to 501 Balance Dynamics Corporation, Ann Arbor, Mich.

Filed Jul. 21, 1989, Ser. No. 383,925
Int. Cl.[5] G06F 15/20; G01M 1/16
U.S. Cl. 364—463 18 Claims



1. A method for controlling a balancer for a rotating device, said balancer containing a plurality of chambers each having a selectably activated or deactivated heating element and a unique phase angle therewith, said rotating device having a vibration transducer and a position sensor disposed thereon, said vibration transducer and position sensor each having a signal output defining a position and a vibration level of said rotating device respectively, said signal outputs each having a phase angle associated therewith, said method comprising:

obtaining initial vibration level and position signals and their associated phase angles;

defining an initial calibration factor to be approximately zero;

determining if said heating elements of said plurality of chambers have been selectably activated;

creating a different calibration factor by adding approximately ninety degrees to said initial calibration factor;

selecting one of said heating elements by use of said different calibration factor;

obtaining a current vibration level signal and associated phase angle;

activating said selected heating element;

measuring new vibration level and position signals and their associated phase angles;

deactivating said selected heating element; and

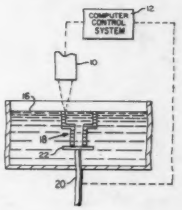
creating a modified calibration factor by modifying said different calibration factor whereby said modified calibration factor substantially reflects a difference between said phase angles of said new vibration level and position signals.

4,977,511

PHOTOSENSITIVE MATERIALS CONTAINING IONIC DYE COMPOUND AS INITIATORS

Peter Gottschalk, Centerville; Douglas C. Neckers, Perrysburg, both of Ohio; Gary B. Schuster, Champaign, Ill.; Paul C. Adair, Springboro, Ohio, and S. Peter Pappas, Fargo, N. Dak., assignors to The Mead Corporation, Dayton, Ohio

Continuation-in-part of Ser. No. 944,305, Dec. 18, 1986, Pat. No. 4,772,530, which is a continuation-in-part of Ser. No. 860,367, May 6, 1986, abandoned, which is a continuation-in-part of Ser. No. 800,014, Nov. 20, 1985, abandoned. This application Apr. 13, 1988, Ser. No. 180,915
Int. Cl.[5] G03C 1/00
U.S. Cl. 364—473 14 Claims



1. A system for producing three dimensional models comprising:

a computer;

a computer monitor;

one or more lasers capable of emitting visible light;

one or more solutions, each containing a free radical addition photopolymerizable or crosslinkable monomer and a photoinitiator, said photoinitiator being capable of absorbing radiation in the visible spectrum and producing free radicals which initiate free radical polymerization or crosslinking of said polymerizable or crosslinkable monomer, said photoinitiator comprising an ionic dye-counter ion compound, said one or more solutions being in optical contact with said one or more lasers; and

one or more pistons capable of upward and downward motion located in said one or more solutions, each of said one or more pistons having a base at its upper surface; and

control means for controlling the emission of visible light by said one or more lasers and the upward and downward motion of said one or more pistons.

4,977,512

THREE DIMENSIONAL SIMULTANEOUS MACHINING AND MEASURING SYSTEM

Ryoji Nakagawa, Kanazawa, Japan, assignor to Shibuya Kogyo Co., Ltd., Ishikawa, Japan

Continuation of Ser. No. 184,354, Apr. 21, 1988, abandoned. This application May 4, 1990, Ser. No. 519,270
Int. Cl.[5] G05B 23/02, 19/42
U.S. Cl. 364—474.37 4 Claims

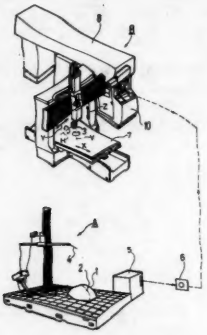
1. An apparatus for efficiently machining a plurality of workpieces, comprising:

measuring means for deriving three dimensional positional data and angular orientation data for each of a plurality of points on a first said workpiece;

machining means for performing a three dimensional machining operation on said first workpiece in response to said positional and angular orientation data; and

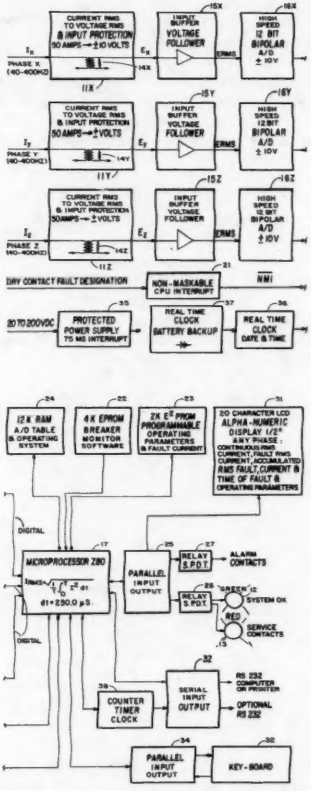
means for effecting operation of said machining means on said first workpiece simultaneously with derivation by said measuring means of additional positional and angular orientation data corresponding to a second said workpiece, including a signal cable connected between said measuring means and said machining means to provide

direct transfer of said positional and angular orientation data from said measuring means to said machining means, and a pair of separate support platforms respectively



associated with said machining means and said measuring means for respectively supporting said first and second workpieces during said simultaneous operation of said machining means and said measuring means.

provide to said storage means a digital signal representation related to the integral of the magnitude of the current


CURRENT RMS TO VOLTAGE RMS & INPUT PROTECTION 50 AMPS → ±10 VOLTS
INPUT BUFFER VOLTAGE FOLLOWER
HIGH SPEED 12 BIT BIPOLAR A/D ± 10V
PHASE X (40-400HZ)
PHASE Y (40-400HZ)
PHASE Z (40-400HZ)
DRY CONTACT FAULT DESIGNATION
NON-MASKABLE CPU INTERRUPT
NMI
20 TO 200VDC
PROTECTED POWER SUPPLY 75 MS INTERRUPT
REAL TIME CLOCK BATTERY BACKUP
REAL TIME CLOCK DATE & TIME
12 K RAM A/D TABLE & OPERATING SYSTEM
4 K EPROM BREAKER MONITOR SOFTWARE
2 K E² PROM PROGRAMMABLE OPERATING PARAMETERS & FAULT CURRENT
20 CHARACTER LCD ALPHA-NUMERIC DISPLAY 1/2" ANY PHASE: CONTINUOUS RMS CURRENT, FAULT RMS CURRENT, ACCUMULATED RMS FAULT CURRENT & TIME OF FAULT & OPERATING PARAMETERS
DIGITAL
MICROPROCESSOR Z80
PARALLEL INPUT OUTPUT
RELAY S.P.D.T.
ALARM CONTACTS
SYSTEM OK
SERVICE CONTACTS
COUNTER TIMER CLOCK
SERIAL INPUT OUTPUT
RS 232 COMPUTER OR PRINTER
OPTIONAL RS 232
KEY-BOARD

flowing through said circuit breaker main contacts immediately after opening.

4,977,513

CIRCUIT BREAKER CURRENT MONITORING

Stephen G. LaPalme, Cape Porpoise, Me., assignor to Power Solutions, Inc., Kennebunk, Me.

Continuation of Ser. No. 642,120, Aug. 20, 1984, abandoned. This application Oct. 19, 1987, Ser. No. 113,341

Int. Cl.[5] **H02H** *7/26*

U.S. Cl. 364—483 **5 Claims**

1. Circuit breaker monitoring apparatus comprising,

a source of a breaker contact current signal representative of the current flowing through circuit breaker main contacts for monitoring,

converting means including analog-to-digital conversion means for converting said current signal to a sequence of digital sample signals representative of instantaneous amplitudes of said current signal,

microprocessing means for processing said digital sample signals to provide a digital signal related to the integral of the magnitude of said current,

storage means for storing digital signals,

and a source of a nonmaskable CPU interrupt signal responsive to the occurrence of an indication when said circuit breaker main contacts will open for then providing said nonmaskable CPU interrupt signal to said microprocessing means for causing said microprocessing means to

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4,977,514

OVERLAID DIGITAL WAVEFORMS DISPLAY

Kevin M. Bush, Colorado Springs, Colo., assignor to Hewlett Packard Company, Palo Alto, Calif.

Continuation of Ser. No. 47,948, May 8, 1987, abandoned. This application Sep. 8, 1989, Ser. No. 405,105

Int. Cl.[5] **G06F** *15/20*; **G09G** *1/16*

U.S. Cl. 364—487 **8 Claims**

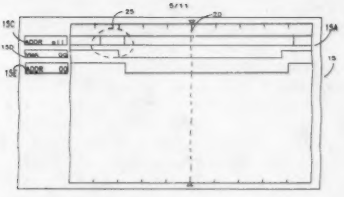
1. A waveform display for a logic analyzer said display being configurable into a plurality of portions wherein each portion is simultaneously visible, said display comprising:

a first portion of said display showing digital waveforms representative of a functional group of digital signals, said waveforms having a logic high level and a logic low level parallel to said logic high level and having vertical edges connecting perpendicular to said logic high and logic low levels, said edges indicating a transition from logic high to logic low or from logic low to logic high, said waveforms being superimposed onto each other such that all the transitions of said waveforms of said groups appear from left to right across said display at a single height level of said display;

a second portion of said display showing at least a single digital waveform in isolation from said first overlaid portion of said display;

means for electronically sampling a first digital signal at predetermined periodic intervals to acquire samples of the value of said signal at said intervals;

means for digitizing said samples in the order in which they were acquired such that if a sample is equal to or above a predetermined threshold value it is digitized to one binary



value and if a sample is below said predetermined threshold value it is digitized to a complementary binary value;

means for storing said binary values in bits in memory in the order in which they were digitized such that the binary values for a given signal are stored in a sequence of bits, said bits having the same bit position in a sequence of memory words; and

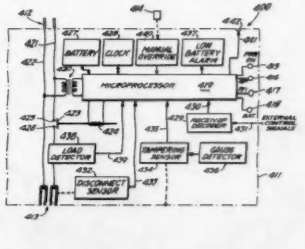
means for mapping one said sequence of bits onto a display, said display having a horizontal time axis, said time axis having a finite number of discrete time-units.

4,977,515

LOAD MANAGEMENT DEVICE AND METHOD OF USE

Frank G. Rudden, 52 Garfield Pl., East Northport, N.Y. 11731, and Walter R. Sarno, 38 Frazer Dr., Greenlawn, N.Y. 11740

Filed Aug. 29, 1988, Ser. No. 237,967
Int. Cl.[5] G06F *15/20*
***U.S. Cl.* 364—492** **26 Claims**



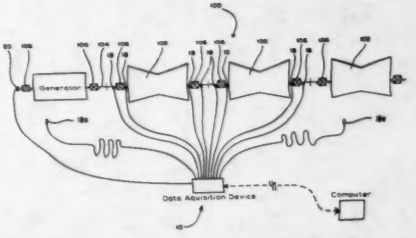
1. A load management system comprising a control device having means for establishing its electrical connection in series with an electric powered appliance, between said appliance and a source of electric power therefor, said device including a microprocessor, switch means coupled to said microprocessor under its control for controlling circuit completion and interruption between said source of electric power and said appliance, said microprocessor including clock means for maintaining real time, memory means coupled to said microprocessor for storing data furnished by said microprocessor, a battery coupled to at least said memory means for sustaining the memory capability of said memory means during interruption of power from said source of electric power, means for receiving electrical control signals from an external source for initiating commencement of either an ON interval or an OFF interval of allowable operation of said appliance, said microprocessor having been pre-programmed to perform a time-clock function of determining the duration of any such initiated interval, sensor means coupled to said microprocessor for sensing changes in the operation of said device, said microprocessor being pre-programmed to record the date and time of each change in its operating mode including each instance of change in programmed operation of said device, at least said memory means being housed in a removable plug-in structure whereby at least said memory means can be removed for independent down-loading of any data stored therein.

4,977,516

DATA ACQUISITION DEVICE FOR BALANCING ROTATING COMPONENTS OF LARGE MACHINERY

James E. Shepherd, 3001 Charwood Pl., Raleigh, N.C. 27612

Continuation of Ser. No. 37,010, Apr. 10, 1987, abandoned. This application Aug. 14, 1989, Ser. No. 393,850
Int. Cl.[5] G01N *29/04*; G01M *13/00*
***U.S. Cl.* 364—508** **5 Claims**



1. A data acquisition device for collecting data concerning vibration of a rotating component which rotates through a cycle, said data acquisitiond device being operable over a plurality of cycles, and responsive to changes in the angular velocity of the rotating component, comprising:

(a) means for generating a first periodic interrupt signal which occurs at least once per cycle;

(b) means for dividing the period of each cycle of the rotating component into a plurality of equal time increments selected by a user, said dividing means including adjustment means for varying said time increments from cycle to cycle depending upon changes in the angular velocity of the rotating component;

(c) means for generating a second periodic interrupt signal for each time increment of each cycle;

(d) a plurality of vibration sensors mounted at spaced locations on the rotating component for detecting vibrations in the rotating component and producing an output signal representative of the vibration at the location of the sensors, wherein vibrations are monitored at a pluraliy of said locations simultaneously;

(e) a signal processor having a plurality of input channels for receiving output signals from respective vibration sensors;

(f) input means forming a part of the signal processor and responsive to the first and second periodic interrupt signals for receiving output signals from a plurality of the vibration sensors in response to each such periodic interrupt signal; and

(g) means for digitizing and storing said output signals for subsequent processing.

4,977,517

LEAK AND CLOG DETECTION AND REMOVAL SYSTEM FOR USE WITH PARTICLE COUNTERS

Walden L. Gibbs, Jr., Wichita Falls; Jimmie L. Carry, and William T. Mostyn, both of Hewitt, all of Tex., assignors to Toni Diagnostics, Inc., Wichita Falls, Tex.

Filed Sep. 21, 1988, Ser. No. 247,411
Int. Cl.[5] G06G *7/57*; G08B *21/00*
U.S. Cl. 364—510 **3 Claims**

3. In a particle counting system for sensing and counting

particles suspended in a sample fluid as said sample fluid is drawn through an orifice from a sample chamber to an enclosed fluid passage, the improvement comprising:

a pressure transducer coupled to said enclosed fluid passage for sensing actual pressure in said enclosed fluid passage;

a pump means, coupled to said enclosed fluid passage, for drawing said sample fluid through said orifice into said enclosed fluid passage at a selected rate to maintain said enclosed fluid passage at a predetermined pressure level if said orifice and enclosed fluid passage are unobstructed;

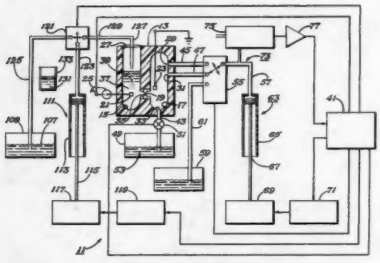
means, coupled to said transducer, for determining whether said actual pressure in said enclosed fluid passage is at an acceptable pressure level as said means for drawing advances said sample fluid through said orifice to said enclosed fluid passage, wherein an unacceptable pressure level indicates a clog impeding passage of fluid from said sample chamber through said aperture to said enclosed fluid passage;

means, coupled to said enclosed fluid passage, for automatically removing said clog when detected;

means, coupled to said enclosed fluid passage, for automatically flushing a rinse fluid through said enclosed fluid passage and said orifice to dislodge said clog;

means, coupled to said enclosed fluid passage, for automatically pumping a cleaning solution through said orifice and said enclosed fluid passage to remove said clog; and

means, coupled to said enclosed fluid passage, for automatically testing to determine if said clog has been removed.

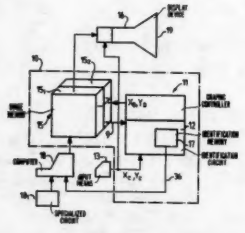


4,977,518

VIDEO GRAPHICS SYSTEM EQUIPPED WITH A GRAPHICS CURSOR

Thierry Bonnet, Champigny, and Yves Mathieu, Boulogne, both of France, assignors to U.S. Philips Corporation, New York, N.Y.

Filed Mar. 2, 1989, Ser. No. 318,085
Claims priority, application France, Mar. 8, 1988, 88 02941
Int. Cl.[5] G06F *15/40*
U.S. Cl. 364—521 **4 Claims**



1. A video graphics system equipped with a graphics cursor and with a comparator which compares the positional co-ordinates X_C, Y_C of the graphics cursor with the co-ordinates X_D, Y_D of each image element of each line, the elements being explored in accordance with a scanning by frames, the graphics cursor interacting with the image delivered by the video graphics system,

characterized in that said video graphics system comprises:

an image memory which, in the course of successive loadings, temporarily stores:

(a) numerical parameters describing encoded surfaces relating to two-dimensional images,

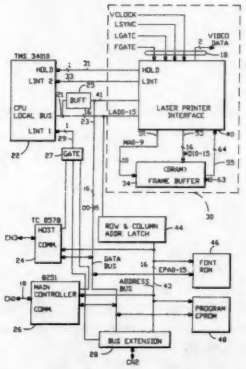
(b) and an N bit identifier, specific to an encoded surface in such a manner that the N bits are successively loaded into said image memory by slices of N/P bits in the course of P successive loadings, where N and P are integers and P is greater than 1 , each loading being followed by a reading of the image memory in order to display the image visually in accordance with the successive frames of the scanning by frames, p1 and a graphics controller which receives the slices of N/P bits at each read frame and reconstructs the N bit identifier of said encoded surface after P successive frames, said graphics controller comprising an identification circuit comprising the comparator and an identification memory which accumulates and stores the slices of N/P bits once the comparator has detected the identity of the co-ordinates X_C, Y_C and co-ordinates X_D, Y_D, the complete identifier stored, in said identification memory being used by the video graphics controller to identify said encoded surface.

4,977,519

LASER PRINTER CONTROLLER FLEXIBLE FRAME BUFFER ARCHITECTURE WHICH ALLOWS SOFTWARE TO CHANGE X AND Y DIMENSIONS OF THE BUFFER

Hershow Chang, Los Altos; Seong Kim, Saratoga, and Tetsuro Motoyama, San Jose, all of Calif., assignors to Ricoh Company, Ltd. and Ricoh Corporation, both of San Jose, Calif.

Filed Jul. 12, 1989, Ser. No. 379,018
Int. Cl.[5] G06F *9/00*
U.S. Cl. 364—519 **8 Claims**



1. A laser printer controller system comprising

a laser printer for printing data on various size documents wherein said documents include first documents having a first size, and second documents having a second, different size,

a controller for controlling said printer, said controller including

a linearly variable frame buffer for receiving input digital data representative of a first number of scan lines and a

second number representative of the number of pixels (dots) per scan line, and

control means for linearly changing said first or second number, depending upon the size of the first or second documents to be printed by said printer.

4,977,520

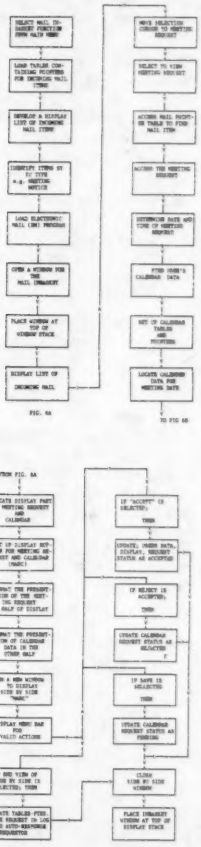
METHOD TO FACILITATE A REPLY TO ELECTRONIC MEETING INVITATION IN AN INTERACTIVE MULTI-TERMINAL SYSTEM EMPLOYING ELECTRONIC CALENDARS

Harry S. McGaughey, III, Raleigh, N.C.; Lovie A. Melkus, Carrollton, and Robert J. Torres, Colleyville, both of Tex., assignors to IBM Corp., Armonk, N.Y.

Filed Feb. 3, 1988, Ser. No. 151,859

Int. Cl.[5] G06F *15/40*

U.S. Cl. 364—521 **10 Claims**



1. An electronic calendaring method for an information handling system which maintains electronic calendars for first and second end users and which comprises a plurality of interactive interconnected end user terminals, to facilitate the calendar entry and reply process by said first end user to an electronic invitation having schedule times issued by said second end user and received by said first end user, said method comprising the combination of the following steps:

(A) issuing said invitation to said first end user,

(B) displaying to said first end user a composite screen comprising the details of said invitation and a section of said first user's calendar corresponding to said schedule times, said section being selected automatically by said system based on said times and in response to a request by said first user to said system to display said invitation, and

(C) providing to said second end user, a reply to said invitation, while said composite screen is being displayed in response to the interactive entry of data into said system by said first end user.

4,977,521

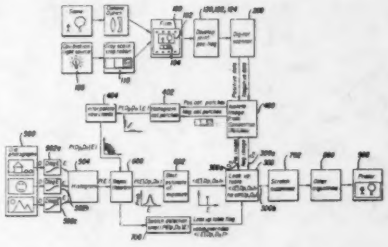
FILM NOISE REDUCTION BY APPLICATION OF BAYES THEOREM TO POSITIVE/NEGATIVE FILM

Martin C. Kaplan, Rochester, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Jul. 25, 1988, Ser. No. 223,812

Int. Cl.[5] G01J *3/40*; G03C *7/00*

U.S. Cl. 364—525 **51 Claims**



21. A system for obtaining enhanced images from photographic film in which there has been exposed a film frame to a scene so as to record an image therein, said system comprising:

means for developing latent and non-latent grains in said film frame in such a manner that a latent grain count D_p and a non-latent grain count D_n in discrete pixels therein may be measured separately;

means for storing a plurality of K distributions of latent and non-latent grain count pairs D_p, D_n for K predetermined exposure values, said K distributions being representative of said film;

means for determining from said K distributions a likeliest exposure value E_l for each one of a plurality of grain count pairs D_p, D_n so as to generate a corresponding plurality of likeliest exposure values; and

means for measuring a grain count pair D_p, D_n in each discrete pixel in said film frame and selecting corresponding one of said likeliest exposure values so as to generate a set of likeliest exposure values representative of the image recorded in said film frame.

4,977,522

APPARATUS FOR DETERMINING THE FORMULATION OF PAINT FOR USE IN BODYWORK REPAIR

Michel David, 20, Avenue d'Ivry, 75013 Paris, France

Filed Nov. 29, 1988, Ser. No. 277,246

Claims priority, application France, Nov. 30, 1987, 87 16601

Int. Cl.[5] G01J *3/50*; G01N *21/25*

U.S. Cl. 364—526 **5 Claims**

1. An apparatus for determining a color formulation of a paint to be used for color matching in the field of bodywork repair, where a bodywork under repair has paint whose original color formulation is specified in terms of at least one base color paint, and said paint color formulation to be used for color matching is liable to be different from said original paint color formulation due to color drift, said apparatus comprising:

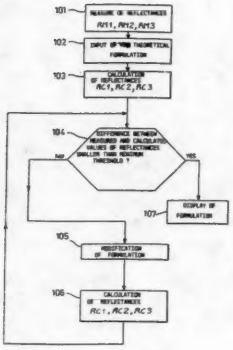
first memory means for storing reflectance data relating to each of a plurality of base color paints;

second memory means for storing at least one of said original paint color formulations;

calculation means cooperating with said first and second memory means for determining a calculated reflectance value, for at least one predetermined wavelength, of a paint formulation composed of at least one of said base color paints;

measuring means comprising a measuring head designed to be applied on one part of said bodywork of which the color is to be reproduced, means for lighting a surface of said bodywork part with lights having said at least one predetermined wavelength, and at least one receiver for picking up the light reflected by said surface in each predetermined wavelength, said receiver producing data representing the reflectance value of the surface in each of said predetermined wavelengths;

comparison means for comparing a measured reflectance value with a calculated reference value, and producing comparison data indicative of a difference between said values;



approximation means cooperating with said calculation means and said comparison means, comprising:

means for formulating at least one calculated paint color; and

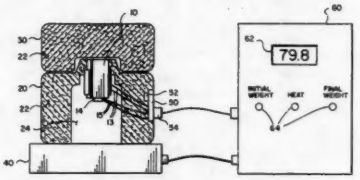
means for successively supplying calculated reflectance values to said comparison means, starting with an original calculated reflectance value corresponding to the original paint color formulation of said bodywork under repair, followed by at least one successive calculated reflectance value, the first of which corresponds to a respective first calculated paint color, whereby said respective first calculated paint color, and each successive calculated paint color thereafter, is formulated in response to said comparison data so that the calculated reflectance thereof, for at least one predetermined wavelength, is closer to said measured reflectance value, for a corresponding wavelength, than the previously calculated reflectance value supplied to said comparison means, whereby a final first paint color formulation is derived approximating said paint color formulation to be used.

4,977,523

APPARATUS FOR THE MEASUREMENT OF SNOW QUALITY

Robert D. Mohler, Fairport, and James C. Liao, Webster, both of N.Y., assignors to Eastman Kodak Company, Rochester, N.Y.

Filed Jan. 6, 1989, Ser. No. 294,525
Int. Cl.[5] G01N *1/14*
U.S. Cl. 364—550 **4 Claims**



1. An apparatus for measuring the ice content of snow, said apparatus comprising:

(a) an insulated sample chamber for receiving a sample of said snow, said sample chamber including:

(i) means for heating said chamber and

(ii) means for measuring the temperature of said chamber; and

(b) computing means detachably connected to said sample chamber including

(i) means for controlling said means for heating and for measuring the amount of heat supplied to said chamber;

(ii) means for monitoring said means for measuring temperature; and

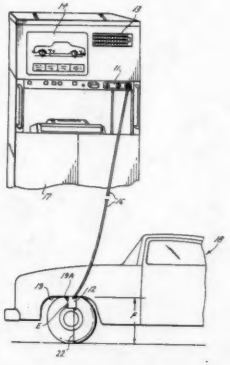
(iii) means for calculating the ice content of said sample from the heat supplied to said chamber and its temperature.

4,977,524

ELECTRONIC MEASURING GAUGE AND APPARATUS FOR ACCURATE VEHICLE STANCE DIAGNOSIS AND GUIDANCE IN EFFECTING WHEEL ALIGNMENT

Timothy A. Strege, Maryland Heights, and Donald A. Schmieley, St. Louis, both of Mo., assignors to Hunter Engineering Company, Bridgeton, Mo.

Filed Jan. 3, 1989, Ser. No. 293,014
Int. Cl.[5] G01B *5/20*
U.S. Cl. 364—562 **6 Claims**



5. Apparatus for use in inspecting and determining vehicle body elevational positions relative to the suspension means

which supports a vehicle body from the wheels on the floor on which the wheels rest, the apparatus comprising:

(a) wheel alignment console means having a storage memory to receive and make available to a service person alignment data for a series of predetermined vehicles, said memory receiving data on vehicle elevational information and location of points for measuring elevation;

(b) means at said console for selecting a predetermined vehicle alignment data and elevational information corresponding to a vehicle presented for inspection and determination of body elevation positions;

(c) means in said console means for displaying a representation of portions of the vehicle presented for inspection, said display means presenting at least one location for initial inspection;

(d) a linear measuring device which electronically transfers measurements into said console means for making said inspection measurement at said displayed location;

(e) circuits in said measuring device and comprising a shaft encoder for entering into said console the completed linear measured value for visual display; and

(f) indicating selectively correct alignment specifications, or an out of specification condition.

4,977,525

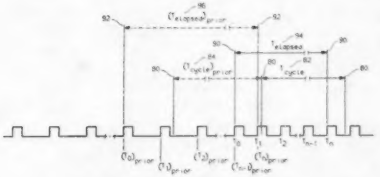
HIGHLY EFFICIENT METHOD AND APPARATUS FOR CALCULATING ROTATIONAL SPEED

Andrew K. Blackwell, Kokomo, Ind., assignor to Delco Electronics Corporation, Kokomo, Ind.

Filed May 30, 1989, Ser. No. 358,790

Int. Cl.[5] G01P *3/36*

U.S. Cl. 364—565 **14 Claims**



1. A method for measuring a speed of a rotating member, the method comprising the steps of:

generating a speed signal for each predetermined angular rotation of the member, the generated signal being directly proportional in frequency to the rotational speed of the member;

establishing successive control cycles each having a calculation interval associated therewith;

counting a number of speed signals generated in each calculation interval; and

for each control cycle, calculating an average time between successive speed signals as a measure of speed of the rotating member based upon (1) the number of speed signals counted in the calculation interval associated with the control cycle and (2) occurrence times of selected speed signals generated in the calculation interval, the occurrence times being determined by (a) forecasting a time in the control cycle after which the selected speed signals will be generated and (b) recording the occurrence time of each sped signal generated in the calculation interval after the forecasted time.

4,977,526

METHOD AND SYSTEM FOR CONTROLLING A DIFFERENTIAL DOSING SCALE

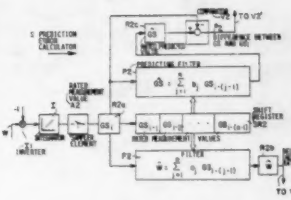
Gerhard Jost, Muehltal, and Hans Werner, Darmstadt, both of Fed. Rep. of Germany, assignors to Carl Schenck AG, Darmstadt, Fed. Rep. of Germany

Filed May 10, 1988, Ser. No. 192,396

Claims priority, application European Pat. Off., May 21, 1987, 87107367.2

Int. Cl.[5] G01G *13/00*; G05B *13/02*

U.S. Cl. 364—567 **7 Claims**



1. A method for controlling a differential dosing scale, especially for dosing loose bulk materials, comprising the following steps:

(a) repeatedly sampling and measuring an output signal (G) from a weighing sensor of said dosing scale to form a series of measured values (G_{i-1}, G_i, G_{i+1}, G_{i+2}, . . . ,);

(b) successively storing each of said measured values in a register (R1*a*) and supplying stored values from said register (R1*a*) in parallel to a first digital calculating filter (F1), a first shift register (SR1), and a digital predicting filter (P1) communicating with each other;

(c) calculating in said first calculating filter (F1) an actual delivery rate (P) from said series of measured values (. . . , G_{i-1}, G_i . . . ,);

(d) predicting in said first predicting filter (P1) from values (G_i, G_{i-1}, G_{i-2}, . . . ,) measured during a previous sampling cycle, a predicted value (G) for a value (G_{i+1}) next to be measured, and storing said predicted value (G) in a register (R1*c*);

(e) comparing in a first comparator (V1) said predicted value (G) with the next actually measured value (G_{i+1}) to form a first difference value (e_1);

(f) prescribing a permissible tolerance value (e_{max}) for said first difference value (e_1);

(g) determining in an evaluation circuit (AU) whether said first difference value (e_1) exceeds said tolerance value (e_{max}) due to a disturbance in said output signal (G);

(h) said calculating step (c) including calculating, in response to said first difference value (e_1) not exceeding said tolerance value (e_{max}), the actual value of the delivery rate (P) in said first calculating filter (F1) and storing the so calculated actual delivery rate (P) in a register (R1*b*), said predicting step (d) including predicting, in response to said first difference value (e_1) exceeding said tolerance value (e_{max}) thereby noting said disturbance, a new predicted value (G) for the next actual value to be measured based on the last actually measured value while holding said actual delivery rate (P) constant, whereby said actual delivery rate (P) and said predicted value (G) are each determined from past values (G_{i-1}, G_{i-2}, . . . , $G_{i(n-1)}$) stored in said shift register (SR1) and from said current measured value (G_i);

(i) activating through said comparator, said evaluation circuit (AU) in response to said first difference value (e_i) exceeding said tolerance value (e_{max}) defining a disturbance, for reloading said shift register (SR1) with new values based on the most recent actual measured value (G_i) to that the same delivery rate (P) is determined in said calculating filter (F1) as before said disturbance occurred

and a predicted value (G) corresponding to a most recent actual measured value (G_l) and to the delivery rate (P) is determined in said predicting filter (PI) and is stored in said register (R1c); and

(j) performing a closed loop control of said delivery rate of said differential dosing scale based on said first difference value, and, in the case of a disturbance in said output signal (G), continuing said closed loop control of said delivery rate based on said constant actual delivery rate (P).

4,977,527

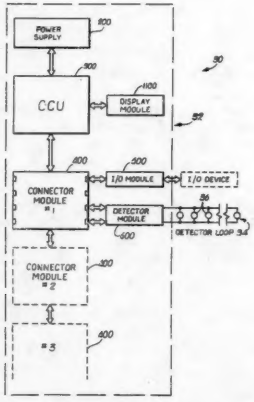
THRESHOLD COMPENSATION AND CALIBRATION IN DISTRIBUTED ENVIRONMENTAL DETECTION SYSTEM FOR FIRE DETECTION AND SUPPRESSION

Bon F. Shaw, Winter Park; Gary M. Bond, Orlando, and Randy R. Fields, Winter Park, all of Fla., assignors to Fike Corporation, Blue Springs, Mo.

Filed Apr. 14, 1988, Ser. No. 181,644

Int. Cl.[5] G08B *17/10*

U.S. Cl. 364—571.03 **25 Claims**



16. A method of detecting the environmental status of a monitored space, said method comprising the steps of;

providing an environmental status detection system including—

at least one environmental status detector in the monitored space including means for sensing an environmental condition parameter and for producing a detection signal representative thereof, said detection signal being subject to signal drift, said detector further including activatable simulation means for selectively creating a condition simulating an environmental condition parameter of predetermined magnitude and in response for producing a test signal representative thereof, and

signal processing means operably coupled with said detector for sending signals thereto, for receiving and processing signals therefrom, and for determining the occurrence of a predetermined environmental condition in the monitored space as a function of said detection signal and selectively alterable threshold data, said signal processing means including memory means for selective storage of data; and

automatically calibrating said system at a predetermined time, said calibrating step including the steps of—

storing data in said memory means representative of said detection signal at said predetermined time as calibration data, such being representative of the environmental status of the monitored space at said predetermined time,

activating said simulation means in order for said detector to produce said test signal in response,

storing test data in said memory means representative of said test signal, and

determining said threshold data as a function of said calibration and test data and storing said threshold data in said memory means for subsequent use in determining said predetermined environmental condition.

4,977,528

APPARATUS AND METHOD FOR DETERMINING THE AMOUNT OF MATERIAL IN A TANK

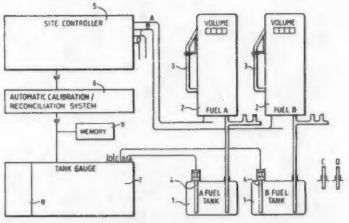
Stephen G. Norris, Kinnoull, Scotland, assignor to Veeder-Root Limited, Smethwick, England

Filed Sep. 22, 1988, Ser. No. 247,776

Claims priority, application United Kingdom, Sep. 23, 1987, 8722414

Int. Cl.[5] G01F *23/00*; F15B *5/00*

U.S. Cl. 364—571.04 **6 Claims**



1. In a system comprising a tank for storing liquid material, sensing means fitted to the tank for sensing liquid level in the tank and providing first output signals, metering means for metering said liquid material and providing second output signals, and processing means having a first input for receiving said first output signals and a second input for receiving said second output signals, said processing means being operative:

(a) to store a first set of data values which represent initial estimates of volumetric quantities of liquid in the tank corresponding to predetermined liquid levels in the tank as sensed by said sensing means, said processing means being programmed with an algorithm which employs a mathematical expression for computing said first data values from said first output signals based on the dimensions of the tank,

(b) to store a second set of data values derived from said second output signals, said second set of data values corresponding with actual volumetric quantities of metered liquid, which volumetric quantities are related to said predetermined liquid levels,

(c) to compare the first and second sets of data values in order to compute errors in the first set of data values with respect to the second set of data values,

(d) to vary the data values in said first set, by varying at least one constant in said mathematical expression, so as to cause new data values to be stored and then to be compared with corresponding data values in said second set to determine if there has been any improvement; the new data value being stored where there is an improvement and the old data value being retained where there is no improvement; the first set of data values which contain the improvements then being employed to provide a corrected calibration characteristic for said sensing means,

(e) to refine the corrected calibration characteristic by again varying the first set of data values and repeating a process of comparing the first and second sets of data values and storing a fresh set of first data values containing any further improvements,

(f) to compute a correlation between the first and second sets

of data values, after each comparison, to determine when there is substantially no further improvement in the calibration characteristic, and

(g) to store the refined and corrected calibration characteristic.

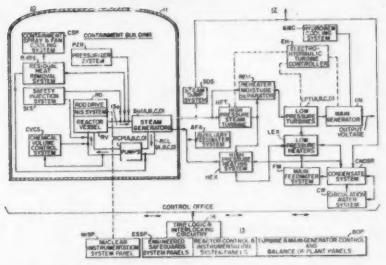
4,977,529

TRAINING SIMULATOR FOR A NUCLEAR POWER PLANT

Gerald L. Gregg, Monroeville; Richard E. Putman, and John W. Gomola, both of Pittsburgh, all of Pa., assignors to Westinghouse Electric Corp., Pittsburgh, Pa.

Filed Feb. 23, 1973, Ser. No. 333,901
Int. Cl.[5] G06F *15/52*
U.S. Cl. 364—578 **49 Claims**

MICROFICHE APPENDIX INCLUDED
(41 Microfiche, 2471 Pages)



1. An automated training simulator for the real-time dynamic operation of a nuclear power plant having a plurality of fluid control devices for governing the fluid behavior throughout the plant; said simulator comprising

a plurality of command devices to generate an input signal corresponding to the desired operational state of each of a respective plurality of representative fluid control devices;

calculating means including sequence controlling means having components operative to generate repetitively during successive time intervals data values relating to fluid behavior for the representative plant, said sequence controlling means including

(a) first means to generate during each said time interval data values relating to the operation of the plurality of representative fluid control devices in accordance with the input signals,

(b) second means to generate during each said time interval data values relating to fluid behavior in accordance with the data values relating to fluid control device operation that are generated during each preceding said time interval, and

a plurality of indicating devices governed by data values relating to fluid physical values for several portions of the representative plant to monitor representative plant operation.

4,977,530

VOLTAGE MONITOR FOR IN-CIRCUIT TESTING

John Cline, Boca Raton, and Ken Gentile, Green Acres City, both of Fla., assignors to Mitel Corporation, Ontario, Canada

Filed May 2, 1988, Ser. No. 189,180
Int. Cl.[5] G05B *23/02*; G01R *19/00*
U.S. Cl. 364—579 **2 Claims**

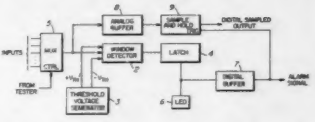
1. In a computer-based system for applying test voltages to one or more circuit components, a monitor for detecting potentially destructive voltages applied to one or more circuit nodes comprised of:

(a) input means for monitoring one or more secondary voltages carried by said nodes, said secondary voltages being generated as a result of said system applying said test voltages to said circuit components,

(b) means for generating first and second threshold voltages, said second threshold voltage being less than said first threshold voltage by a predetermined amount,

(c) means for comparing said secondary voltages to said first and second threshold voltages and generating an alarm signal in the event said one or more secondary voltages are either greater than said first threshold voltage or less than said second threshold voltage, thereby indicating the presence of said potentially destructive voltages,

(d) means for receiving said alarm signal and in response



causing interruption of operation of said computer-based system, thereby inhibiting generation of said potentially destructive voltages,

(e) an analog buffer circuit connected to said input means, for receiving and buffering said one or more secondary voltages and in response to receipt of said one or more secondary voltages generating one or more buffered analog voltages, and

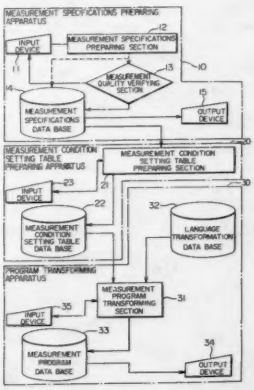
(f) a sample and hold circuit for receiving said alarm signal and in response sampling said buffered analog voltages and generating sampled digital representations of said potentially destructive voltages applied to said one or more additional circuit components.

4,977,531

APPARATUS FOR AUTOMATIC PREPARATION OF MEASUREMENT PROGRAMS

Teruaki Ogata, and Yuko Sudou, both of Itami, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Japan

Filed Nov. 18, 1988, Ser. No. 272,934
Claims priority, application Japan, Jun. 28, 1988, 63-158067
Int. Cl.[5] G01R *31/28*; G06F *11/30*
U.S. Cl. 364—580 **11 Claims**



1. An apparatus for preparing measurement programs used in operating one of a plurality of measurement apparatus for measuring the properties of an electronic circuit comprising.

measurement specifications input means for inputting measurement specifications for the electronic circuit;

measurement quality verification means connected to said measurement specifications input means for comparing the measurement specifications input through said measurement specifications input means with previously set standard measurement specifications and for modifying the measurement specifications input according to the result of the comparison, said measurement quality verification means having an output for outputting modified measurement specifications;

measurement condition setting table preparing means having an input for receiving the modified measurement specifications prepared by said measurement quality verification means for developing the modified measurement specifications into a measurement condition setting table having a form that allows the measurement condition setting table to be easily adapted to the hardware of said measurement apparatus, said measurement condition setting table preparing means having an output for outputting the measurement condition setting table;

a language transformation data base including a program language dictionary corresponding to said measurement apparatus; and

measurement program transforming means having a first input connected to said language transformation data base and having a second input for receiving the measurement condition setting table prepared by said measurement condition setting table preparing means for transforming the measurement condition setting table prepared by said measurement condition setting table preparing means, using the program language dictionary in said language transformation data base, into a measurement program, said measurement program transforming means having an output for outputting the measurement program.

4,977,532

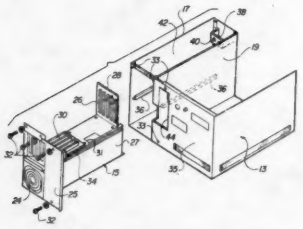
INDUSTRIAL COMPUTER SYSTEM WITH REMOVABLE EQUIPMENT DRAWER

Neil L. Borkowicz, Canton, and Craig A. Moore, Ypsilanti, both of Mich., assignors to Xycom, Inc., Saline, Mich.

Continuation of Ser. No. 178,204, Apr. 6, 1988, abandoned. This application Feb. 20, 1990, Ser. No. 483,338

Int. Cl.[5] **G06F** *1/00;* **H05K** *7/16*

U.S. Cl. 364—708 **18 Claims**



1. An industrial computer system comprising a video monitor, a plurality of computer cards, a disk drive, and power supply circuitry, all contained within a single cabinet, and further including:

a removable drawer assembly having a forward end and a rearward end, that can be removed from and inserted into a compartment within said cabinet by sliding said drawer assembly along a first axis, said drawer assembly containing one or more of said plurality of computer cards, said disk drive, and/or said power supply circuitry;

guide means for guiding and positioning said drawer assembly as it is inserted along said first axis into said compartment within said cabinet;

locator means separate from said guide means which is engaged as said drawer assembly is fully inserted along said first axis into said compartment, said locator means aligning and supporting the forward end of said drawer assembly therein;

electrical connector means which is engaged as said drawer assembly is fully inserted along said first axis into said compartment for automatically making electrical connections to the components in said drawer assembly; and

fastening means for securing the rearward end of said drawer assembly to said cabinet once said drawer assembly is fully inserted therein.

4,977,533

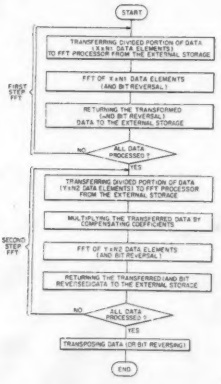
METHOD FOR OPERATING AN FFT PROCESSOR

Nobuyoshi Miyabayashi; Masami Hosono, both of Tokyo, and Atsushi Abe, Akishima, all of Japan, assignors to JEOL Ltd., Tokyo, Japan

Filed Oct. 10, 1989, Ser. No. 419,088

Int. Cl.[5] **G06F** *15/40*

U.S. Cl. 364—726 **6 Claims**


START
TRANSFERRING DIVIDED PORTION OF DATA (X1N1 DATA ELEMENTS) TO FFT PROCESSOR FROM THE EXTERNAL STORAGE
FFT OF X1N1 DATA ELEMENTS (AND BIT REVERSAL)
RETURNING THE TRANSFORMED (AND BIT REVERSAL) DATA TO THE EXTERNAL STORAGE
FIRST STEP FFT
NO
ALL DATA PROCESSED ?
YES
TRANSFERRING DIVIDED PORTION OF DATA (Y1N2 DATA ELEMENTS) TO FFT PROCESSOR FROM THE EXTERNAL STORAGE
MULTIPLYING THE TRANSFERRED DATA BY COMPENSATING COEFFICIENTS
FFT OF Y1N2 DATA ELEMENTS (AND BIT REVERSAL)
RETURNING THE TRANSFERRED (AND BIT REVERSED)DATA TO THE EXTERNAL STORAGE
SECOND STEP FFT
NO
ALL DATA PROCESSED ?
YES
TRANSPOSING DATA (OR BIT REVERSING)
END

1. A process of operating an FFT hardware processor in communication with an external data storage device for fast Fourier transforming data in large quantities stored in an external storage comprising the steps of:

(a) organizing the data held in said external storage to consist of data elements indexed by N1 rows and N2 columns, such that each data element is retrieved by index bits corresponding to said row and column;

(b) retrieving the data elements from the external storage along the column direction and transferring the said data elements to the processor;

(c) fast Fourier transforming the data elements by the processor to produce once transformed data elements;

(d) reversing the index bits corresponding to each once transformed data element in the processor;

(e) returning the bit-reversed once transformed data elements to the external storage such that the data transferred to external storage is organized to consist of data elements indexed by rows and columns defined by the index bits;

(f) retrieving the bit-reversed once transformed data elements from the external storage along the row direction and transferring the said data elements to the processor;

(g) multiplying the bit-reversed once transformed data elements by compensating coefficients;

(h) fast Fourier transforming data elements comprising the product of the bit-reversed once transformed data elements and the compensating coefficients by the processor to produce twice transformed data elements;

(i) reversing the index bits corresponding to each twice transformed data element in the processor;

(j) returning the data comprising bit-reversed twice transformed data element to the external storage such that the data transferred to external storage consists of data elements organized in rows and columns indexed by the index bits; and

(k) transposing the bit-reversed twice transformed data elements stored in the external storage.

4,977,534

OPERATION CIRCUIT BASED ON FLOATING-POINT REPRESENTATION WITH SELECTIVE BYPASS FOR INCREASING PROCESSING SPEED

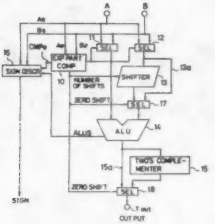
Hiromasa Takahashi, Ebina, Japan, assignor to Fujitsu Limited, Kawasaki, Japan

Filed Mar. 8, 1989, Ser. No. 320,496

Claims priority, application Japan, Mar. 11, 1988, 63-58826

Int. Cl.[5] G06F *7/38*

U.S. Cl. 364—748 **9 Claims**



1. An operation circuit for processing two input operands, each represented in the floating-point representation system with a sign, an exponent part and a mantissa part, comprising:

comparing means for comparing the values of the exponent parts of said two input operands with each other and thereby determining the number of shifts required with respect to the mantissa part of one of said two input numbers thereby to make the respective exponent part values of the two input operands coincide and producing a comparison result output indicating the number of shifts and correspondingly the relationship in magnitude of the values of the exponent parts of said two input operands;

selecting means for selectively outputting the mantissa parts of said two input operands, based on said comparison result output of said comparing means;

shifter and bypass means for receiving as an input thereto and shifting, by the number of shifts indicated by the comparison result output of said comparing means, the mantissa part of an operand having a smaller exponent part value as selectively output by said selecting means and producing the shifted mantissa part as an output when the values of the exponent parts of said two input operands are different from each other, and for receiving and directly outputting, thereby bypassing the shifting means, outputting one of the mantissa parts of said two input operands as selectively output by said selecting means when the values of the exponent parts of said two input operands are identical to each other;

operation means for performing a predetermined operation on the mantissa part output of said shifter and bypass means and the mantissa part of the other operand as selectively output by said selecting means, thereby producing an operation result as the output of said operation means;

an output terminal;

a bypass line and a two's complementer, each receiving the operation result output of said operation means, said two's complementer producing as an output the two's complement of the operation result and said bypass line directly outputting the operation result; and

a final output result selector having first and second inputs respectively connected to the output of said two's complementer and to said second bypass line and an output connected to said output terminal, said f.o.r. selector being controlled by the comparison result output of said comparing means and, in response thereto, selectively supplying the two's complement operation result output of the two's complementer to the output terminal as the final operation result output when the values of the exponent parts of the two input operands are identical, and selectively supplying said operation result as directly output by said second bypass line to said output terminal as the final operation result output when the values of the respective exponent parts of the two input operands are different from each other.

4,977,535

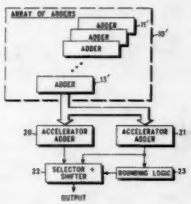
METHOD OF COMPUTATION OF NORMALIZED NUMBERS

Ari Birger, Haifa, Israel, assignor to Motorola, Inc., Schaumburg, Ill.

Filed Dec. 8, 1989, Ser. No. 447,768

Int. Cl.[5] G06F *7/38*

U.S. Cl. 364—748 **7 Claims**



1. Apparatus for receiving and performing computations with floating point numbers comprising:

first means for receiving a carry bit operand and a sum bit operand from a multiplication operation and substantially simultaneously computing therefrom a first number and a second number which equals the first number incremented by two;

second means coupled to the first means for performing a predetermined further computation based upon a predetermined rounding algorithm which determines whether an output of the multiplication operation requires normalizing; and

third means coupled to the first and second means for selectively outputting as the output of the multiplication operation one of said first and second numbers in accordance with the outcome of the further computation.

4,977,536

DOCUMENT PROCESSOR

Yoshiyuki Shimamura, Yokohama, Japan, assignor to Canon Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 805,715, Dec. 6, 1985, abandoned. This application Apr. 16, 1990, Ser. No. 511,939

Claims priority, application Japan, Dec. 10, 1984, 59-259302; Dec. 10, 1984, 59-259303

Int. Cl.[5] G06F *7/24, 11/00*

U.S. Cl. 364—900 **20 Claims**

1. Information processing apparatus comprising:

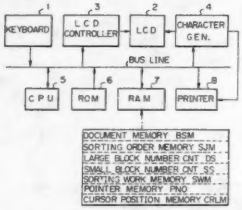
memory means for storing a sequence of character information and discrimination information to be used for discriminating the sequence of character information;

indication means for indicating the sequence of character information stored in said memory means in a first character array format;

discrimination means, connected to said memory means for

discriminating the sequence of character information stored in said memory means in accordance with the discrimination information; and

sort means responsive to the discriminating by said discrimination means for sorting the sequence of character information in the first character array format and for storing



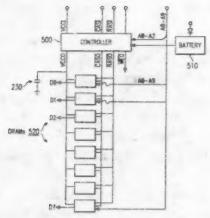
in said memory means the sorted sequence of character information in a second character array format different from the first character array format, wherein the sequence of character information to be sorted is a sequence of character information discriminated with the discrimination information.

4,977,537

DRAM NONVOLATIZER

Donald R. Dias, and Francis A. Scherpenberg, both of Carrollton, Tex., assignors to Dallas Semiconductor Corporation, Dallas, Tex.

Filed Sep. 23, 1988, Ser. No. 248,865
Int. Cl.[5] G06F *12/16*; G11C *11/40*
U.S. Cl. 364—900 **43 Claims**



11. A computer system, comprising:

at least one input device;

at least one output device;

at least one processor unit, operatively connected to said input and output devices;

a power supply, which provides a system supply voltage on at least one system supply voltage line;

at least one battery;

and at least one memory subsystem, accessible by said processor unit comprising:

a plurality of dynamic random access memories (DRAMs) having input connections to receive refresh control signals and power supply; and

a controller;

wherein said controller is connected and programmed to connect said system supply voltage line to said power supply connections of said DRAMs under normal operating conditions;

wherein said controller is also connected and programmed to receive and regulate the output of said battery to thereby provide a supply voltage output to said power supply connections of said DRAMs when a failure of the system supply voltage occurs;

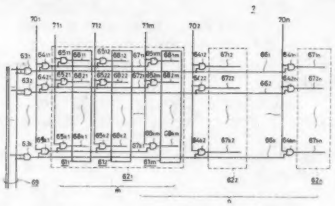
and wherein said controller provides refresh control signals, with appropriate timing, to said DRAMs when a failure of the system supply voltage occurs.

4,977,538

SEMICONDUCTOR MEMORY DEVICE HAVING HIERARCHICAL ROW SELECTING LINES

Kenji Anami, and Katsuki Ichinose, both of Hyogo, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Aug. 29, 1989, Ser. No. 400,223
Claims priority, application Japan, Aug. 29, 1988, 63-214302
Int. Cl.[5] G11C *8/00*, *11/407*, *11/408*
U.S. Cl. 365—230.03 **60 Claims**



1. A semiconductor memory device comprising:

a memory cell array formed of a plurality of memory cells arranged in matrix; wherein said memory cell array is divided in the direction of columns into a plurality of large groups of memory cells, and each of said plurality of large memory cell groups is further divided in the direction of columns into a plurality of small groups of memory cells, said semiconductor memory device further comprising:

a plurality of first row-selecting lines provided in said memory cell array;

a plurality of second row-selecting lines provided in each of said plurality of large memory cell groups;

a plurality of word lines provided in each of said plurality of small memory cell groups and connected to said memory cells;

means for supplying a first selecting signal for selecting one of said plurality of large memory cell groups;

means for supplying a second selecting signal for selecting one of said plurality of small memory cell groups;

first decoder means responsive to an internal address signal for selecting one of said first row-selecting lines to activate the same;

plurality of second decoder means provided in each said large memory cell group for selecting a second row-selecting line associated with said selected first row-selecting line to activate the same in the large memory cell group selected by said first selecting signal; and

plurality of third decoder means provided in each said small memory cell group for selecting a word line associated with said selected second row-selecting line to activate the same in the small memory cell group selected by said second selecting signal.

4,977,539

HIGH-SPEED SEARCHING APPARATUS FOR CDP

Keun C. Lee, Seoul, Rep. of Korea, assignor to Goldstart Co. Ltd., Seoul, Rep. of Korea

Filed Nov. 29, 1988, Ser. No. 277,267
Claims priority, application Rep. of Korea, Nov. 30, 1987, 13596/1987
Int. Cl.[5] G11B *7/00*
U.S. Cl. 369—44.11 **7 Claims**

1. A high-speed apparatus for controlling a search operation of a predetermined position on a disc comprising:

an optical pickup slidably positioned on a pickup guide shaft above the top surface of the disc for developing a servo signal indicative of the position of said optical pickup;

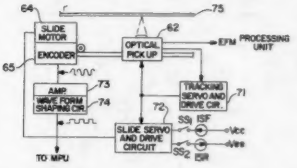
a slide motor disposed on a rotary shaft for slidably positioning said optical pickup above the top surface of the disc;

a tracking servo and drive circuit for outputting a tracking servo and drive signal in response to said servo signal from

said optical pickup;

a slide servo and drive circuit for driving said slide motor in response to said tracking servo and drive signal from said tracking servo and drive circuit;

encoder means mounted on said rotary shaft of said slide



motor for outputting pulse signals according to the rotation of said slide motor;

amplifier means for developing amplified signals of said pulse signals from said encoder means;

a waveform shaping circuit for shaping said amplified signals from said amplifier means; and

a main processing unit for detecting the number of said amplified signals shaped by said waveform shaping circuit and calculating the position of said optical pickup to determine whether said optical pickup is positioned at said predetermined position.

4,977,540

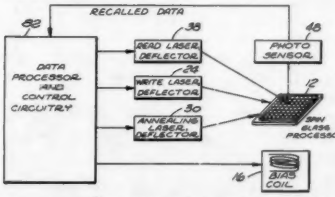
SPIN GLASS TYPE ASSOCIATIVE PROCESSOR SYSTEM

James M. Goodwin, Los Angeles; Bruce E. Rosen, Marina del Rey; Jacques J. Vidal; John D. Mackenzie, both of Los Angeles, and Edward T. H. Wu, Agoura Hills, all of Calif., assignors to The Regents of the University of California, Berkeley, Calif.

Filed Jun. 22, 1988, Ser. No. 209,976

Int. Cl.[5] G11C *7/00, 15/00, 13/06*

U.S. Cl. 365—49 **19 Claims**



1. An associative data processing system comprising:

(a) a body of a polarizable material, the polarization of zones of said body being facilitated or enabled by the application of mobility enabling energy in the presence of a polarizing field;

(b) said body of material including a plurality of input zones, a plurality of output zones, and means including a plurality of associative zones located between said input and output zones for coupling polarization between said input and output zones;

(c) means for selectively applying a polarizing field to said polarizable material;

(d) means for applying polarization enabling energy in a first selected pattern to said input and said output zones in the presence of the polarizing field, to polarize the input and output areas to register a first digital pattern therein;

(e) means for applying a substantially uniform mobility enabling energy to the associative zones while the input and output zones are polarized and in the absence of the polarizing field, so that the associative zones are at lease partially polarized and to modify interactions in the associative zones;

(f) means for applying additional patterns to said system as set forth in paragraphs (d) and (e) hereinabove;

(g) means for applying an output control pattern only to selected input zones of said layer;

(h) means for applying polarization enabling energy to said associative zones and said output zones to control the binary polarization state of said output zones; and

(i) means for withdrawings output signals from said output zones in response to said output control input pattern applied to said input zones as specified in paragraph (g), with said output zones assuming a polarization state which is a function of said patterns applied to the input and output zones pursuant to steps (d) through (f), the polarization of said associative areas, and step (h) as set forth above;

whereby the output based on paragraphs (g), (h) and (i) is a result of the previous series of inputs to the system which constitute a learning function, and this output need not and often will not be a direct binary function of the current inputs to the system.

4,977,541

EPROM PROGRAMMING

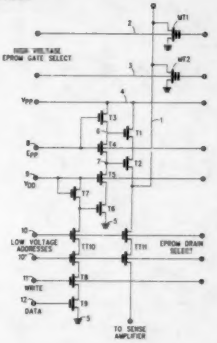
Jean-Claude Tarbouriech, Ville-La-Grand, France, assignor to Motorola, Inc., Schaumburg, Ill.

Filed Jun. 9, 1989, Ser. No. 363,751

Claims priority, application United Kingdom, Jun. 17, 1988, 8814421

Int. Cl.[5] G11C *11/40*

U.S. Cl. 365—189.11 **9 Claims**



1. An EPROM memory transistor programming arrangement comprising a MOS memory transistor; gate select means for applying gate programming voltage to a gate of the transistor; a load line including a first and a second MOS transistor coupled in series between a first programming supply line and a drain electrode of the memory transistor; switching means for selectively applying to a gate electrode of the first and second transistors a programming potential derived from a second programming supply line, and gating means having a low voltage address input and a data input for receiving an address signal, and a data signal, and for providing an output control signal to the switching means in response thereto.

4,977,542

DYNAMIC SEMICONDUCTOR MEMORY DEVICE OF A TWISTED BIT LINE SYSTEM HAVING IMPROVED RELIABILITY OF READOUT

Yoshio Matsuda; Kazuyasu Fujishima; Tsukasa Ooishi; Kazutami Arimoto, and Masaki Tsukude, all of Hyogo, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

Filed Aug. 30, 1989, Ser. No. 400,898

Claims priority, application Japan, Aug. 30, 1988, 63-217108

Int. Cl.[5] G11C *11/40*

U.S. Cl. 365—207 **21 Claims**

17. A semiconductor memory device comprising:

a plurality of memory cells arranged in a matrix of rows and columns, for storing information charge;

a first memory cell area where part of said memory cells are formed;

a second memory cell area formed adjacent to said first memory cell area part of said memory cells being formed

in said second memory cell area;

a third memory cell area where part of said memory cells are formed;

a first dummy cell area formed between said second and third memory cell areas;

a fourth memory cell area formed adjacent to said first dummy cell area, part of said memory cells being formed in said fourth memory cell area;

a fifth memory cell area adjacent to said fourth memory cell area, part of said memory cells being formed in said fifth memory cell area;

a sixth memory cell area formed adjacent to said fifth memory cell area, part of said memory cells being formed in said sixth memory cell area;

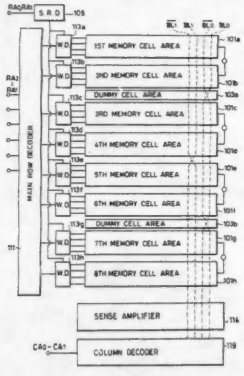
a seventh memory cell area where part of said memory cells are formed;

a second dummy cell area formed between said sixth and seventh memory cell areas;

an eighth memory cell area formed adjacent to said memory cell area, part of said memory cells being formed in said eighth memory cell area;

a plurality of bit line pairs each including a pair of bit lines having at least one twisted portion, the respective bit lines being provided corresponding to the rows of said memory cells and connected to the memory cells of the corresponding rows;

a plurality of word lines provided corresponding to the columns of said memory cells in a direction intersecting



with said bit line pairs, and connected to the memory cells of the corresponding columns;

read means for selecting any of said word lines by applying a potential thereto, and reading the information charge of each of the memory cells connected to the selected word line onto one of the bit lines of each said bit line pair;

a plurality of sense amplifiers provided corresponding to the respective bit line pairs, each said sense amplifier detecting a potential difference appearing between the bit lines of the corresponding bit line pair when the information charges of the memory cells are read by said read means;

a plurality of dummy cells, at least one dummy cell being provided for each said bit line in said first or second dummy cell area;

a plurality of dummy word lines provided corresponding to the respective dummy cells in a direction intersecting with said bit line pairs, and connected to the corresponding dummy cells, a predetermined potential being applied to said dummy word lines; and

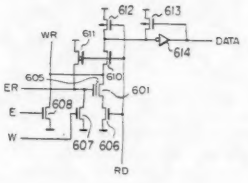
potential cancel means responsive to the selection of the word line by said read means, for cancelling the application of said predetermined potential to the dummy word line connected to any of the dummy cells provided with respect to the bit line to which the memory cell connected to the selected word line is connected.

4,977,543

CONTROL CIRCUIT FOR EEPROM

Tanagawa Kouzi, Tokyo, Japan, assignor to Oki Electric Industry Co., Ltd., Tokyo, Japan

Division of Ser. No. 238,823, Aug. 31, 1988, Pat. No. 4,907,202.
This application Jan. 26, 1990, Ser. No. 471,968
Claims priority, application Japan, Aug. 31, 1987, 63-215452
Int. Cl.[5] G11C *13/00*
U.S. Cl. 365—218 **1 Claim**



1. A high voltage shaping switch circuit having first and second nodes, comprising:

a first NAND gate having a first input terminal to receive clock pulse, a second input terminal to receive a first control signal and an output terminal;

a second NAND gate having a first input terminal to receive inverse pulse of the clock pulse, a second input terminal to receive the control signal and an output terminal;

a first transistor having a first terminal connected to the first node, a control terminal connected to the second node and a second terminal;

a second transistor having a first terminal connected to the first node, a second terminal and a control terminal connected to the second node;

a third transistor having a first terminal connected to the second node, a second terminal connected to the second terminal of the first transistor and a control terminal connected to the second terminal of the first transistor;

a first capacitor connected between the output terminal of the first NAND gate and the second terminal of the first transistor; and

a second capacitor connected between the output terminal of the second NAND gate and the second node.

4,977,544

ULTRASONIC MICROSCOPE

Koichi Karaki, Hino; Mitsugu Sakai, and Yasuo Sasaki, both of Hachiooji, all of Japan, assignors to Olympus Optical Co., Ltd., Tokyo, Japan

Filed Jul. 12, 1989, Ser. No. 378,767
Claims priority, application Japan, Jul. 21, 1988, 63-182679
Int. Cl.[5] G01N *29/00, 29/22*
U.S. Cl. 367—7 **20 Claims**

1. An ultrasonic microscope comprising:

an acoustic lens for applying an ultrasonic beam to a sample;

first supporting means for supporting said acoustic lens;

second supporting means for supporting said sample to set the sample opposite to said acoustic lens;

drive means for moving said acoustic lens in one direction so that the distance between said acoustic lens and the sample varies by moving said first supporting means; and

means for containing cryogenic liquid used as an ultrasonic transmission medium, in which said acoustic lens and sample are immersed;

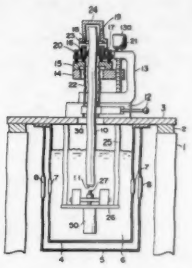
said first supporting means including:

scanning means for causing said acoustic lens to scan the sample two-dimensionally in a plane perpendicular to said one direction;

a support base for supporting said drive means; and

at least two stays supporting said base at points different from each other and being movable in said one direction;

said drive means being coupled to said at least two stays so as to adjust a moving amount of each stay independently,



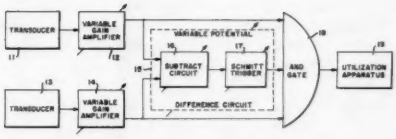
said drive means including adjust means for adjusting the slope of said lens with respect to the sample.

4,977,545

TARGET DETECTOR

Willis A. Teel, and Louis F. Jones, both of Panama City, Fla., assignors to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed May 3, 1966, Ser. No. 547,717
Int. Cl.[5] G01S *3/80*
U.S. Cl. 367—124 **8 Claims**



1. Means for detecting the presence of radiant energy of predetermined intensity within a given volume of environmental medium comprising a in combination:

a first transducer means for producing an electrical signal in response to predetermined radiant energy;

a second transducer contiguously disposed with said first transducer means for producing an electrical signal in response to said predetermined radiant energy;

first variable means connected to the output of said first transducer means for amplifying the electrical signal produced thereby a predetermined amount;

second variable means connected to the output of said second transducer means for amplifying the electrical signal produced thereby a predetermined lesser amount than that effected by the aforesaid first variable electrical signal amplifying means;

variable potential difference circuit means connected to the outputs of said first and second variable amplifying means for producing an output signal whenever the voltage difference between the electrical output signal therefrom exceeds a predetermined amount; and

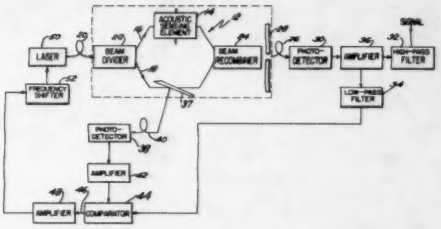
an AND gate having a trio of inputs and an output, with a pair of the inputs thereof respectively connected to the outputs of the aforesaid first and second variable amplifying means, with the remaining input thereof connected to the output of said variable potential difference circuit means, and with the output thereof adapted for being connected to a utilization apparatus.

4,977,546

SIGNAL STABILIZATION IN OPTICAL HYDROPHONES

James P. Flatley, Norwich, and Peter Shajenko, Storrs, both of Conn., assignors to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed Jan. 29, 1982, Ser. No. 347,112
Int. Cl.[5] H04R *29/00*
U.S. Cl. 367—140 **4 Claims**



1. A signal stabilized optical hydrophone comprising:

interferometer means for providing a reference beam and a fringe pattern;

a first photodetector optically connected to receive said fringe pattern and provide an output electrical signal having the fringe pattern information, said output electrical signal comprised of a signal current and a direct current;

a high pass filter connected to receive said output electrical signal and conducting the signal current and inhibiting the flow of the direct current;

a low pass filter connected to receive said output electrical signal and conducting the direct current and inhibiting the flow of the signal current;

a second photodetector optically connected to receive said reference beam and providing an output electrical signal having said reference beam information;

a comparator connected to receive the output electrical signal from said second photodetector and the direct current from said low pass filter and providing an output signal of the difference;

a frequency shifter connected to receive the output signal of said comparator and providing an output signal suitable for shifting the frequency of a laser; and

a laser connected to receive the output signal of said frequency shifter and for optically providing a beam to said interferometer.

4,977,547

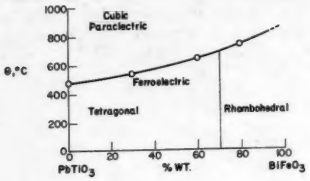
METHOD OF DETECTING SOUND IN WATER USING PIEZOELECTRIC-POLYMER COMPOSITES WITH 0-3 CONNECTIVITY

Jayne R. Giniewicz; Robert E. Newnham; Leslie E. Cross, all of State College, Pa., and Ahmad Safari, Dayton, N.J., assignors to Hoechst Celanese Corp., Somerville, N.J.

Division of Ser. No. 742,334, Jun. 7, 1985, abandoned. This application Nov. 15, 1988, Ser. No. 271,579
Int. Cl.[5] H04R *17/00*
U.S. Cl. 367—157 **7 Claims**

1. A method of detecting acoustic waves in water comprising: using an underwater hydrophone device containing a piezoelectric-polymer composite of 0–3 connectivity, said

composite comprising a matrix of insulating polymer and a piezoelectric ceramic powder dispersed within said polymer



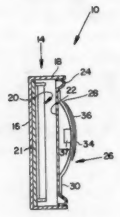
matrix, said ceramic powder comprising a $PbTiO_3$-$BiFeO_3$ solid solution containing 50–80% by weight of $BiFeO_3$.

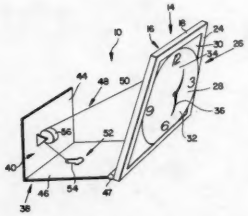
4,977,548

CLOCK SECURITY DEVICE

Gary Rein, Bronxville, N.Y., assignor to Brown & Williamson Tobacco Corporation, Louisville, Ky.

Filed Apr. 23, 1990, Ser. No. 513,398
Int. Cl.[5] G04B *47/00, 19/06*
U.S. Cl. 368—10 **7 Claims**





1. A clock security device to be hung on a wall of a facility, comprising:

a clock having a convex mirrored face for reflecting a panorama view of the facility in which the clock security device is installed; and,

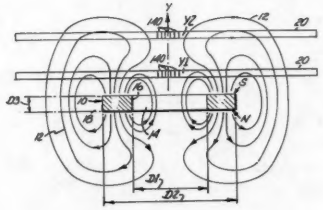
means for mounting the device on the wall with the convex mirrored surface at different selected positions relative to the wall through a vertical arc parallwe to the wall and tilted downwardly at different selected included angles to the wall to change the vertical field of view reflected by the convex clock face.

4,977,549

WRITE AND ERASE MAGNETIC BIAS FIELD SWITCHING SYSTEM FOR A MAGNETO-OPTIC DISK DRIVE

Thomas E. Berg, Colorado Springs, Colo., assignor to Hewlett Packard Co., Palo Alto, Calif.

Filed Sep. 20, 1988, Ser. No. 246,776
Int. Cl.[5] G11B *11/10, 11/12, 13/04*
U.S. Cl. 369—13 **32 Claims**



1. A method for generating write and erase bias fields for use in conjunction with a magneto-optic recording medium on which data can be written and erased, including:

providing a magnet with a side surface and producing a magnetic field which changes in polarity with increasing distance from the side surface, the magnetic field having a first polarity at a first distance from the side surface and a second opposite polarity at a second greater distance from the side surface;

positioning the magnet with the side surface at the first distance from the magneto-optic recording medium and facing the recording medium, when erasing data; and

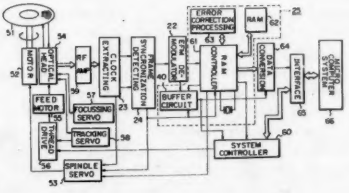
positioning the magnet with the side surface at the second distance from the magneto-optic recording medium and facing the recording medium, when writing data.

4,977,550

DISC PLAYBACK APPARATUS FOR PLAYBACK OF MUSIC AND DIGITAL DATA

Tsuneo Furuya, Kanagawa; Shunsuke Fuukawa, Tokyo, and Katsuya Hori, Kanagawa, all of Japan, assignors to Sony Corporation, Tokyo, Japan

Continuation of Ser. No. 767,798, Aug. 14, 1985, abandoned. This application Dec. 22, 1988, Ser. No. 291,415
Claims priority, application Japan, Dec. 16, 1983, 58-237370; Dec. 23, 1983, 58-243486
The portion of the term of this patent subsequent to May 6, 2003, has been disclaimed.
Int. Cl.[5] G11B *21/10*
U.S. Cl. 369—32 **4 Claims**



1. In an apparatus for playback from a disc, on which main digital data and subsidiary digital data, for selectively reproducing the main digital data, are recorded in multiplex fashion, said apparatus being responsive to control signals for designat-

ing the position on said disc from which said main digital data is reproduced, the combination comprising:

means for reproducing said main digital data and said subsidiary digital data,

means for generating a write clock synchronized with a reproduced signal from the disc,

means for generating a read clock having a predetermined period,

a buffer memory, means for writing main digital data reproduced form the disc into said buffer memory in response to the write clock and means for reading out said buffer memory in response to the read clock,

a first in-first out buffer register, means for writing the subsidiary digital data reproduced from the disc into said FIFO buffer register in response to the write clock and means for reading out said FIFO buffer register in response to the read clock, and

control means connected to said FIFO buffer register for designating a position on said disc to reproduce said main digital data in response to the subsidiary digital data read form the FIFO buffer register.

4,977,551

OPTICAL DISK TRACKING CONTROL SYSTEM AND METHOD HAVING NORMALIZED TRACKING ERROR CONTROL SIGNAL

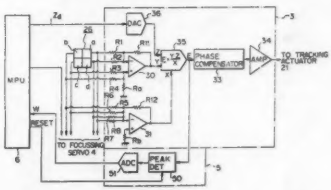
Akira Minami, Yokohama, and Shigeyoshi Tanaka, Kawasaki, both of Japan, assignors to Fujitsu Limited, Kawasaki, Japan

Filed Mar. 10, 1988, Ser. No. 166,490

Claims priority, application Japan, Mar. 12, 1987, 62-57777

Int. Cl.[5] G11B 7/95

U.S. Cl. 369—44.25 **18 Claims**



1. An optical disk system comprising:

means for supporting an optical disk having a plurality of grooves for storing data;

an optical head associated with the supporting means and comprising a source of light, an object lens for focussing light received thereby as a light beam spot onto a selected groove of an optical disk supported by the supporting means, a light receiver, an optical system associated with the object lens, the source of light and the light receiver, the optical system directing light emitted by the light source to the object lens and receiving an image of the light beam spot reflected from the optical disk and directing same to the light receiver, the light receiver producing an output signal indicative of the reflected image of the light beam spot, and focussing and tracking actuators associated with the object lens, the focussing actuator being controllable for moving the object lens and correspondingly the focussed light beam spot produced thereby relatively to the optical disk in a path perpendicular to the disk surface and the tracking actuator being controllable for moving the object lens and correspondingly the focussed light beam spot produced thereby in a lateral direction parallel to the surface of the optical disk and transversely to the grooves therein; and

control means, comprising a focussing servo portion and a tracking servo portion, each responsive to the output signal of the light receiver, for producing and supplying corresponding focussing and tracking control outputs respectively to the focussing actuator for moving the object lens to focus the light beam spot on the surface of the optical disk and to the tracking actuator for moving the object lens to position the focussed light beam spot relative to the center of a selected groove;

the tracking servo portion of the control means comprising first and second circuit means, each responsive to the output signal of the light receiver, respectively for generating a tracking error signal:Y and a sum signal:X, and a correction circuit for calculating the value of and producing the output:

$$E = \frac{Y \cdot Z}{X}$$

where Z is a correction factor, means for peak detecting the calculated value:E output by the correction circuit, and means for adjusting the correction factor:Z to normalize the calculated value:E in accordance with the peak detected value:E, and a circuit for phase-adjusting the normalized, calculated value:E.

4,977,552

SPLIT TYPE OPTICAL PICK-UP DEVICE WITH A TRACKING ERROR DETECTOR ON THE MOVING PART

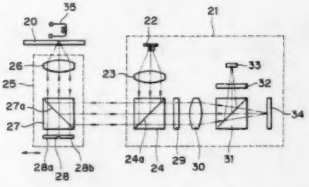
Hiroshi Gotoh, Kawasaki, Japan, assignor to Ricoh Company, Ltd., Tokyo, Japan

Filed Aug. 15, 1988, Ser. No. 232,319

Claims priority, application Japan, Aug. 17, 1987, 62-203832

Int. Cl.[5] G11B 7/00

U.S. Cl. 369—44.14 **20 Claims**



1. An optical pick-up device comprising:

a first optical system including alight source for emitting light;

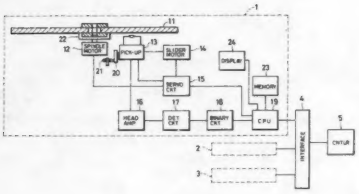
a second optical system including tracking error detecting means, deflecting means for deflecting said light from said first optical system in a predetermined direction, focusing means for focusing the thus deflected light onto an optical information recording medium which reflects said focused light in the form of reflected light having p and s polarized light, said deflecting means deflecting a portion of said light reflected from said optical information recording medium toward said first optical system and permitting the remaining portion of said light reflected from said optical information recording medium to pass therethrough and to impinge on said tracking error detecting means, said deflecting means having different rates of transmission for p and s polarized light in said light reflected from said optical information recording medium; and

wherein said first and second optical systems are movable relative to each other.

4,977,553
METHOD AND APPARATUS FOR IDENTIFYING THE TYPE OF SERVO SYSTEM TO BE USED WITH A GIVEN DISC

Fumihiko Yokogawa, Saitama, Japan, assignor to Pioneer Electronic Corporation, Tokyo, Japan

Filed May 23, 1988, Ser. No. 197,242
Claims priority, application Japan, May 22, 1987, 62-125322
Int. Cl.[5] G11B *7/00*
U.S. Cl. 369—44.26 11 Claims



1. A recording disc having an eccentricity, said disc comprising:

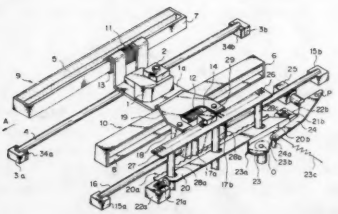
a first region, located concentrically on said recording disc and having an inner and outer radius, for recording user data; and

a second region concentric with said first region and having an inner and outer radius, said second region having a width in a radial direction of said recording disc, that is larger than an amount of said eccentricity, said second region having recorded therein identification data for identifying a type of tracking servo loop system for said recording disc, said identification data being recorded a plurality of times in a CAV format by a phase-encoding system so as to be readable when said tracking servo loop is open.

4,977,554
SLIDER-POSITION DETECTOR FOR DETECTING THE POSITION OF THE SLIDER OF A DISK PLAYER

Toshimasa Hangai; Koichi Ishitoya, and Akihiko Tagawa, all of Tokorozawa, Japan, assignors to Pioneer Electronic Corporation, Tokyo, Japan

Filed Sep. 21, 1989, Ser. No. 410,310
Claims priority, application Japan, Feb. 20, 1989, 1-41366
Int. Cl.[5] G11B *17/30*
U.S. Cl. 369—215 20 Claims



1. A slider-position detector mounted on a disk player which has a pickup for reading information recorded in a recording disk, a slider carrying said pickup and capable of moving linearly in a radial direction of said disk, stopping means for abutting and physically limiting movement of said slider in a predetermined direction, and driving means for moving said slider, said slider-position detector comprising:

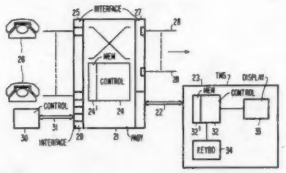
up-down counter means for providing a value in a number of counts varying according to distance and directions of movement of said slider; and

control means for controlling said driving means and said up-down counter means, wherein said control means caused said driving means to move said slider in said predetermined direction, and causes said up-down counter means to up-count or down-count in accordance with said predetermined direction of said slider, said control means setting said up-down counter means to a predetermined value when said slider abuts said stopping means and when a counting rate of said up-down counter means decreases below a predetermined rate during movement in said predetermined direction of said slider.

4,977,555
ASYNCHRONOUS DUPLEX DATA COMMUNICATION FOR REQUESTING SERVICES

Franciscus J. L. Dams, Hilversum, Netherlands, assignor to U.S. Philips Corporation, New York, N.Y.

Filed Jan. 13, 1989, Ser. No. 297,822
Claims priority, application Netherlands, Jan. 20, 1988, 8800124
Int. Cl.[5] H04L *5/14*
U.S. Cl. 370—29 10 Claims



1. A method of asynchronous data communication between first and second stations through a common communication channel, the communication relating to a plurality of services to be performed by one of the first and second stations, the method comprising the steps of:

(a) initializing a communication link, by the first station;

(b) transmitting an initialization request through the channel, from the first station to the second station, the initialization request comprising data representing:

(i) a requested service; and

(ii) a number of times n, where n is an integer greater than zero, of requested simultaneous performances of the requested service; and

(c) sending an initialization response through the channel, from the second station to the first station, the initialization response comprising data representing:

(i) the requested service; and

(ii) a number of times m, where m is a non-negative integer, of allocated simultaneous performances of the requested service, for which number m simultaneous performances are feasible, where $m \leqq n$.

4,977,556
PACKET SWITCHING SYSTEM FOR A DISTRIBUTED PROCESSING ISDN SWITCH

Akira Noguchi, Tokyo, Japan, assignor to NEC Corporation, Japan

Filed Jul. 10, 1989, Ser. No. 377,633
Claims priority, application Japan, Jul. 11, 1988, 63-170972; Jul. 29, 1988, 63-188310
Int. Cl.[5] H04J *3/02, 3/26*
U.S. Cl. 370—60 2 Claims

1. A packet switching system for a distributed process ISDN (Integrated Services Digital Network) switch comprising:

a plurity of terminal line control units, each being connected

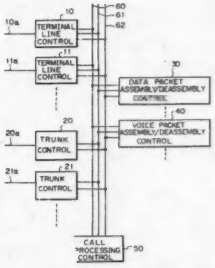
to a respective one of a plurality of ISDN terminals for controlling a B channel and a D channel;

a plurality of trunk control units for performing X.25 protocol control to connect said ISDN switch to another ISDN switch;

a data packet assembly/disassembly control unit for assembling and disassembling data to be transmitted to any of the ISDN terminals and data received from any of the ISDN terminals;

a voice packet assembly-disassembly control unit for assembling and disassembling voice to be transmitted to any of the ISDN terminals and voice received from any of the ISDN terminals;

an internal bus interconnecting said terminal line control units, said trunk control units, and said data and voice packet assembly/disassembly control units for causing data and voice to be transferred, said internal bus including (i) a packet bus for transferring packetized data and



voice between said data and voice packet assembly/disassembly control units and said trunk control units and (ii) a message bus for transferring non-packet data and voice between said data and voice packet assembly/disassembly control units and said terminal line control units, and for transferring packetized data from said data packet assembly/disassembly control unit to said terminal line control units;

a call processing control unit for performing call processing call processing control in response to call control data received from any of the ISDN terminals; and

a call control bus interconnecting said terminal line control units, said trunk control units, said data and voice packet assembly/disassembly control units, and said call processing control unit for causing the call control data to be transferred;

wherein said data and voice packet assembly/disassembly control units are shared by said plurality of terminal line control units.

4,977,557

METHOD OF PROVIDING EFFECTIVE PRIORITY ACCESS IN A DUAL BUS SYSTEM

Van P. T. Phung, Ottawa, and Rungroj Kositpaiboon, Nepean, both of Canada, assignors to Northern Telecom Limited, Montreal, Canada

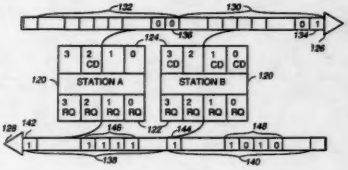
Filed Dec. 14, 1989, Ser. No. 450,792

Int. Cl.[5] H04J *3/12*

U.S. Cl. 370—85.6 **11 Claims**

1. A method of providing priority access in a communications system comprising dual unidirectional and oppositely directed buses and stations connected therebetween, in which bandwidth is provided by slots and a first station passes slots to a second station on one bus and receives requests for useable slots from the second station via the other bus, the method comprising the steps of:

providing at each station a count for each of at least two priority levels; and



at the first station, increasing or not one count in dependence upon priority level of request received, increasing the other count in response to each request, by more than any concurrent increase of the first count.

4,977,558

DEMULTIPLEXING DEVICE OF SYNCHRONOUS MULTIPLEXING SYSTEM

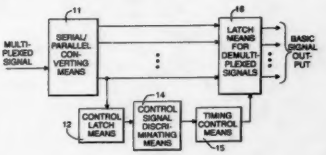
Kazuo Iguchi, Yokohama; Tetsuo Soejima, Tama; Toshiaki Watanabe, Kawasaki, and Shigeo Amemiya, Yokohama, all of Japan, assignors to Fujitsu Limited, Kawasaki, Japan

Continuation of Ser. No. 199,042, Apr. 29, 1988, abandoned. This application Feb. 28, 1990, Ser. No. 485,833

Claims priority, application Japan, Aug. 30, 1986, 61-204739; Aug. 30, 1986, 61-204740

Int. Cl.[5] H04J *3/06, 3/12*

U.S. Cl. 370—112 **11 Claims**



1. A demultiplexing device of a synchronous multiplexing system which has a control signal including a multiplexing channel number in a basic signal frame, comprising:

serial/parallel converting means, having an output, for converting an input multiplexed signal into parallel signals output via a plurality of multiplexing channel outputs having sequentially different time slots;

control latch means for latching the parallel signal of a particular one of said multiplexing channel outputs of said serial/parallel converting means at a predetermined timing;

control signal discriminating means for discriminating a multiplexing channel output number corresponding to said one of said multiplexing channel outputs and determining a difference between the multiplexing channel number of said control signal and the multiplexing channel output number;

timing control means for generating a timing signal corresponding to the determined difference;

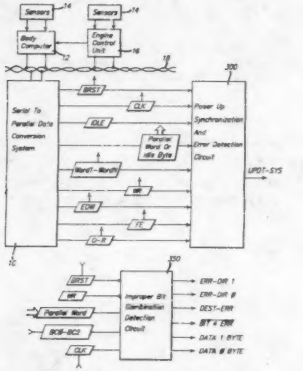
demultiplexed signal latch means for latching the outputs of said serial/parallel converting means based on the timing signal and for generating outputs corresponding to the number of multiplexed channel outputs.

4,977,559

IMPROPER BIT COMBINATION DETECTION CIRCUIT

John M. McCambridge, Northville, Mich., assignor to Chrysler Corporation, Highland Park, Mich.

Filed Dec. 19, 1988, Ser. No. 286,195
Int. Cl.[5] G06F 11/00
U.S. Cl. 371—57.1 3 Claims



1. An adaptive improper bit detection apparatus for detecting patterns of improper bit combinations of a plurality of parallel bytes representing system functions that are asynchronously updated, said bytes being stored temporarily in storage registers of said apparatus, a first byte entering asychronously into said detection apparatus as parallel function data representing magnitude information followed by an accompanying second byte representing destination and direction information, the destination information being provided in a lower nibble that contain logic variables that indicate a symbol of the function being received, and the direction information being provided in an upper nibble that contain variables that indicate a direction for routing the function data information contained in the first byte, said function and destination information being sent to said detection apparatus as often as the function needs updating, said detection apparatus examining each lower nibble to determine whether a conjunction of the bit values of the lower nibble represent a proper symbol for accompanying the function data word, wherein certain upper nibble bits of the function destination byte are used in combination with bits of the lower nibble of the function destination byte for determining the proper bit combination of the symbol, said system comprising:

(a) first logic means having input terminals for receiving each lower nibble binary variable of the destination word that designates the function symbol being processed and producing therefrom at an output, a first enabling conjunctive signal representing a product of the lower nibble variables, said first logic means producing a disabling output signal if the product of the lower nibble variable equals the product of the variables of a first chosen function symbol of the plurality of symbols;

(b) second logic means adapted to receive at input terminals each second and third position variable of each symbol and producing therefrom at an output terminal, a second enabling conjunctive signal representing the sum of an inverse second and third variable, said second logic means producing a disabling output signal if the sum of the inverse second and third variable equals the sum of the inverse second and third variables of a second chosen function symbol;

(c) third logic means adapted to receive at input terminals said first enabling conjunctive signal, said second enabling conjunctive signal and a next-to-least significant variable of said upper nibble and producing therefrom at an output terminal a third enabling conjunctive signal representing a first error signal if the product of said first and second enabling conjunctive signals and said next-to-least significant variable of said upper nibble causes an enabling signal at the output terminal of said third logic means, said third logic means producing a disabling output signal if the product of the conjunctive input signals and the upper nibble variable causes a disabling signal to appear at the output terminal of said third logic means;

(d) forth logic means adapted to receive simultaneously at input terminals said second enabling conjunctive signal and a least significant variable of the upper nibble and producing therefrom at an output terminal a fourth enabling conjunctive signal that represents a second error signal if the product of said second enabling conjunctive signal and the least significant variable of the upper nibble causes an enabling signal to appear at the output terminal of said fourth logic means, said fourth logic means producing a disabling output signal if the product of said second enabling conjunctive signal and the least significant position variable od the upper nibble causes a disabling signal at the output terminal of said fourth logic means;

(e) fifth logic means adapted to receive simultaneously at input terminals a most and a next-to-most significant position variable of the upper nibble and produce therefrom at an output terminal a fifth enabling conjunctive signal that represents a third error signal if the sum of said most and the next-to-most significant variables produces an enabling output of said fifth logic means, said fifth logic means producing a disabling output signal if the sum of the most and next-to-most significant variable of the upper nibble causes a disabling signal at the output terminal of said fifth logic means; and

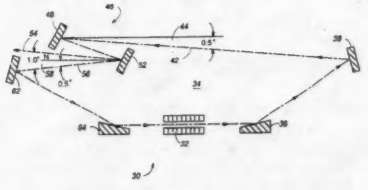
(f) buffer means adapted to receive a most significant variable of the lower nibble and produce therefrom at an output a fourth error signal if the most significant variable produces an enabling signal at the output terminal of said buffer means, said buffer means producing a disabling output signal if the variable of the lower nibble causes a disabling signal at said output terminal of said buffer means.

4,977,560

NEAR-PERFECT DIFFRACTION GRATING RHOMB

Paul J. Wantuck, Santa Fe, N. Mex., assignor to The United States of America as represented by the United States Department of Energy, Washington, D.C.

Filed Jun. 30, 1989, Ser. No. 373,532
Int. Cl.[5] H01S 3/00
U.S. Cl. 372—2 8 Claims



1. A grating rhomb, comprising:

a first grating having a first groove spacing for receiving an input beam at an angle of incidence and outputting a first diffracted beam; and

a second grating angularly tilted relative to said first grating for receiving said first diffracted beam and outputting a second diffracted beam at an angle offset from said input beam, said second grating having a second groove spacing different from said first groove spacing by an amount

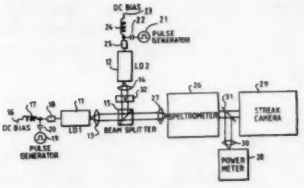
effective to limit the angular dispersion of said output beam within selected limits for a given output beam bandwidth.

4,977,561

OSCILLATION MODE SWITCHING LASER DEVICES

Hiroyuki Ibe, Kanagawa, and Hideaki Yamakawa, Tokyo, both of Japan, assignors to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Continuation of Ser. No. 162,905, Mar. 2, 1988, abandoned. This application Aug. 24, 1989, Ser. No. 397,887
Claims priority, application Japan, Mar. 17, 1987, 62-61967; Aug. 14, 1987, 62-202652; Sep. 14, 1987, 62-228620
Int. Cl.[5] H01S 3/10
U.S. Cl. 372—23 28 Claims



1. A laser device, comprising;

a semiconductor laser, said semiconductor laser having at least two longitudinal modes with wavelengths λ_1 and λ_1 at which it is able to oscillate, and means for oscillating said semiconductor laser at the single longitudinal mode λ_0; and

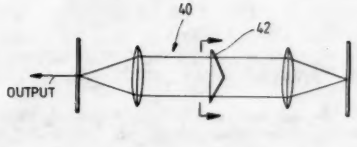
means for causing said semiconductor laser to oscillate in said longitudinal mode λ_1 without requiring a sustained external light input comprising input means for at least temporarily inputting to said semiconductor laser a wave of a wavelength which nearly coincides with said wavelength λ_1 of said semiconductor laser from λ_0 to λ_1.

4,977,562

METHOD AND APPARATUS FOR LASER FREQUENCY STABILIZATION

Albert B. Welch, Dallas, Tex., and Marion W. Scott, Albuquerque, N. Mex., assignors to LTV Aerospace and Defense Co., Dallas, Tex.

Continuation of Ser. No. 102,352, Sep. 29, 1987, abandoned. This application Oct. 19, 1989, Ser. No. 425,366
Int. Cl.[5] H01S 3/13
U.S. Cl. 372—32 10 Claims



1. A frequency-stable laser resonator, comprising:

a resonant lasing cavity;

an excitor for generating a substantially monochromatic electromagnetic signal in said cavity; and

a passive frequency stabilizer providing a continuum of differing optical path lengths in exchange for variation in a variable mode parameter, said variable mode parameter being selected from the group consisting of beam direction, direction of linear polarization, and annular wavefront radius,

wherein the signal follows an optical path that varies along the continuum of optical path lengths together with variation in the variable mode parameter such that said signal has a frequency of oscillation that is substantially determined by a peak of a fluorescence profile and the frequency of oscillation is substantially unaffected by variation in the variable mode parameter,

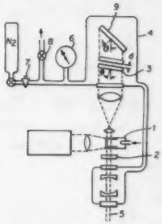
thereby producing a frequency-stable resonator.

4,977,563

LASER APPARATUS

Hajime Nakatani; Yoshifumi Minowa, and Hitoshi Wakata, all of Hyogo, Japan, assignors to Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

PCT No. PCT/JP88/00970, § 371 Date May 23, 1989, § 102(e) Date May 23, 1989, PCT Pub. No. WO89/03132, PCT Pub. Date Apr. 6, 1989
PCT Filed Sep. 22, 1988, Ser. No. 362,409
Claims priority, application Japan, Sep. 26, 1987, 62-241066; Mar. 10, 1988, 63-31893
Int. Cl.[5] H01S 3/13
U.S. Cl. 372—32 24 Claims



1. A laser apparatus comprising:

a laser means for generating a laser beam;

a wavelength control means for controlling a wavelength of the laser beam comprising a gas-filled vessel;

a wavelength monitoring means for determining the wavelength of the laser beam; and

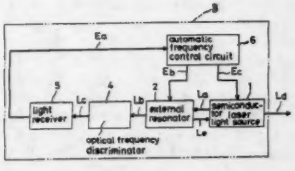
control means responsive to the wavelength monitoring means for controlling a pressure of the gas in the gas-filled vessel.

4,977,564

CONTROLLER FOR SEMICONDUCTOR LASER LIGHT SOURCE

Shiro Ryu, Kanagawa, and Kiyohumi Mochizuki, Hachioji, both of Japan, assignors to Kokusai Denshin Denwa Co., Ltd., Tokyo, Japan

Filed May 25, 1989, Ser. No. 356,967
Claims priority, application Japan, Jul. 1, 1988, 63-162451
Int. Cl.[5] H01S 3/13
U.S. Cl. 372—32 4 Claims



1. In a system including a semiconductor laser light source, means for feeding back a very small portion of light emitted

from said source and reflecting it as a return light to said laser light source and means for feeding back a remainder passing-through portion to regulate a spectral linewidth of said laser light source and to regulate an oscillation frequency of said laser light source in terms of a phase of said return light or a driving injection current for said source,

the improvement comprising a resonator provided externally of said laser light source at one of the ends of said laser light source so that onky a very small portion of said light emitted from said either end is allowed to pass through said resonator, the other portion thereof is reflected as said return light by said resonator directly to said laser light source, and the optical path length for said return light is altered;

an optical frequency discriminator for converting changes in the frequency of said portion that has passed through said resonator into changes in intensity of light; a light receiver for converting said changes in intensity to an electric signal;

and an automatic frequency control circuit for effecting feedback control of sadi injection current for said laser light source and feedback control of said phase and said optical pathlength of said return light reflected from said resonator in response to said intensity changes in said signal.

4,977,565

METHOD AND APPARATUS FOR STABILIZING OSCILLATION FREQUENCY SEPARATION AMONG PLURAL LASER DEVICES

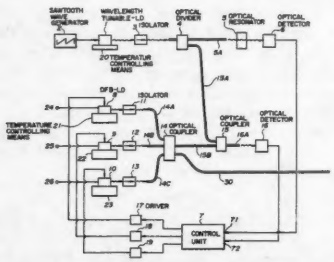
Naoki Shimosaka, Tokyo, Japan, assignor to NEC Corporation, Tokyo, Japan

Filed Jul. 20, 1989, Ser. No. 382,469

Claims priority, application Japan, Jul. 20, 1988, 63-182216

Int. Cl.[5] H01S *3/13*

U.S. Cl. 372—32 **3 Claims**



1. A method for stabilizing oscillation frequency separation among plural laser devices, comprising:

sweeping the oscillation frequency of a reference semiconductor laser device to which an external signal is applied to radiate a light output whose oscillation frequency varies over a range of frequencies;

driving plural semiconductor laser devices to radiate light outputs each at an oscillation frequency in the frequency range of said oscillation frequency sweep of light output from said reference semiconductor laser;

combining the frequency swept light output from said reference semiconductor laser and said light outputs from said plural semiconductor laser devices to produce combined light signals which are then converted to electric signals, a low frequency component of said electric signals being filtered to produce a train of beat pulses corresponding to said oscillation frequencies of said plural semiconductor laser devices;

passing a part of the frequency swept light output from said reference semiconductor laser through an optical resonator having periodic resonant frequencies to produce reference light outputs at said periodic resonant frequencies which are then converted to electric reference pulses, the interval between said periodic resonant frequencies being equal to a predetermined oscillation frequency separation among said plural semiconductor laser devices;

comparing occurrence times of said beat pulses and those of said reference pulses to produce error signals corresponding to the time difference therebetween;

controlling the oscillation frequencies of said plural semiconductor laser devices such that said error signals are approximately equal to a predetermined value;

monitoring the occurrence of each beat pulse of said beat pulses in a predetermined time duration before and after the occurrence of said reference pulses; and

producing a dummy beat pulse at the end of said predetermined time duration where no beat pulse is detected in said monitoring of said occurrance of said each beat pulse, said dummy beat pulse being compared with a corresponding reference pulse of said reference pulses to produce said error signal.

4,977,566

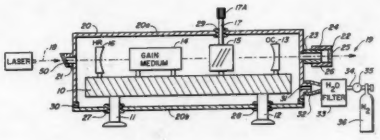
PURGED CAVITY SOLID STATE TUNABLE LASER

Richard L. Herbst, Palo Alto; Anthony J. Alfrey, Half Moon Bay, and Shawn D. Streeby, Sunnyvale, all of Calif., assignors to Spectra-Physics, Inc., Mountain View, Calif.

Filed Feb. 2, 1990, Ser. No. 473,861

Int. Cl.[5] H01S *13/00*

U.S. Cl. 372—33 **15 Claims**



1. A tunable laser, comprising:

a resonant cavity, including an output coupler;

a solid state gain medium, mounted within the resonant cavity;

means for supplying excitation energy to the gain medium;

tuning means, mounted within the resonant cavity, for selecting a wavelength of oscillation in the resonant cavity over a range of wavelengths;

an enclosure surrounding the resonant cavity, the solid state gain medium and the tuning means, and having a gas port;

means, coupled to the gas port of the enclosure, for purging the enclosure of air.

4,977,567

SEMICONDUCTOR LASER ARRANGEMENT FOR HIGH OUTPUT POWERS IN THE LATERAL FUNDAMENTAL MODE

Christian Hanke, Munich, Fed. Rep. of Germany, assignor to Siemens Aktiengesellschaft, Berlin and Munich, Fed. Rep. of Germany

Filed Oct. 11, 1989, Ser. No. 419,707

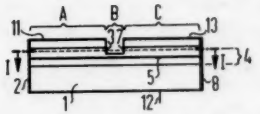
Claims priority, application Fed. Rep. of Germany, Oct. 28, 1988, 3836802

Int. Cl.[5] H01S *3/19*

U.S. Cl. 372—45 **12 Claims**

1. A semiconductor laser arrangement having a laser region (A) provided for generating emission and provided with a first contact (11) and with a second contact (12) for applying an operating voltage, having a waveguide (4) for lateral and vertical wave guidance with reference to the propagation direction of the emission, having a mirrored, first resonator

boundary surface (2) and having an exit face (8) for the emission, comprising a coupling region (B) adjoining the laser region (A) and an intensification region (C) adjoining this coupling region (B) located between the first resonator boundary surface (2) and the exit face (8), lateral wave guidance being at least greatly reduced in this intensification region (C); the coupling region (B) having a configuration which causes the transmissivity of this coupling region (B) for emission from



the laser region (A) to be within prescribed limits; the waveguide (4) being continuously fashioned from the laser region (A) across the coupling region (B) to the intensification region (C); a part of the waveguide (4) arranged in the laser region (A) having a lateral dimension and a vertical dimension which effect an oscillation of the emission of the laser in the fundamental mode perpendicularly to its propagation direction; and a third contact (13) provided for current injection into the intensification region (C).

4,977,568

SEMICONDUCTOR LASER DEVICE

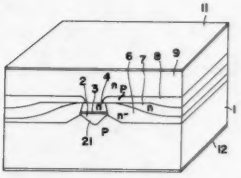
Saburo Yamamoto; Masahiro Hosoda, both of Nara; Kazuaki Sasaki, Yao, and Masaki Kondo, Tenri, all of Japan, assignors to Sharp Kabushiki Kaisha, Osaka, Japan

Filed Dec. 19, 1988, Ser. No. 286,682

Claims priority, application Japan, Dec. 18, 1987, 62-322600; Dec. 22, 1987, 62-326387

Int. Cl.[5] H01S *3/19*

U.S. Cl. 372—46 **5 Claims**



1. In a semiconductor laser device with a stripe-channeled substrate and a double-heterostructure multi-layered crystal disposed over the substrate, said multi-layered crystal containing an active layer for laser oscillation, which semiconductor laser device comprises:

an optical waveguide that is formed within the active layer just above the striped channel of the substrate based on a decrease in the effective refractive index due to said striped channel, the outside of which absorbs a laser beam produced in the active layer;

a striped mesa that is formed by the removal of the portions of said multi-layered crystal corresponding to the outside of said optical waveguide; and

a plurality of burying layers that are grown into the removed portions, said burying layers being made of high resistive substances to prevent the diffusion of carrier in the transverse direction within the active layer, and said burying layers being formed in a position other than above the upper face of said striped mesa.

4,977,569

INTEGRATED SEMICONDUCTOR LASER

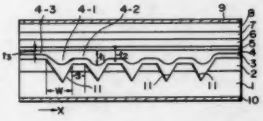
Ryozo Furukawa; Keisuke Shinozaki, and Toshiaki Fukunaga, all of Tokyo, Japan, assignors to Oki Electric Industry Co., Ltd., Tokyo, Japan

Filed Jul. 20, 1989, Ser. No. 382,294

Claims priority, application Japan, Jul. 22, 1988, 63-181552

Int. Cl.[5] H01S *3/19*

U.S. Cl. 372—50 **6 Claims**



1. In an integrated phase-locked semiconductor laser wherein a plurality of waveguide paths extend in parallel to each other, the improvement comprising:

a semiconductor substrate having opposite major surfaces;

a current blocking layer formed on one of the opposite major surfaces, and divided into a plurality of interchannel regions by a plurality of stripe-like channels, each of which has a bottom reaching at least the one major surface, said current blocking layer having opposite side regions which are thicker than the plurality of interchannel regions;

a first cladding layer covering a surface of said current blocking layer and the bottoms of the channels;

a waveguide layer formed on said first cladding layer and having a substantially flat surface which is opposite to said first cladding layer;

an active layer formed on the surface of said waveguide layer;

a light-reflecting layer formed on said active layer;

a second cladding layer formed on said light-reflecting layer; and

a cap layer formed on said second second cladding layer;

whereby said waveguide layer has an effective refractive index profile which sequentially decreases in the order of first regions corresponding to the plurality of channels, second regions corresponding to the plurality of interchannel regions and third regions corresponding to the opposite side regions.

4,977,570

SEMICONDUCTOR LASER ARRAY WITH STRIPE ELECTRODES HAVING PADS FOR WIRE BONDING

Mitsutoshi Hasegawa, Yokohama, Japan, assignor to Canon Kabushiki Kaisha, Tokyo, Japan

Continuation of Ser. No. 292,313, Dec. 30, 1988, abandoned. This application Mar. 9, 1990, Ser. No. 492,363

Claims priority, application Japan, Jan. 13, 1988, 63-003781

Int. Cl.[5] H01S *3/19*

U.S. Cl. 372—50 **6 Claims**

1. A semiconductor laser array comprising:

a substrate;

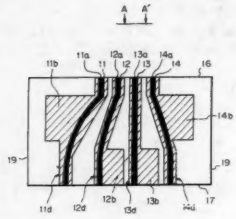
plural semiconductor layers formed on said substrate, said plural layers comprising a laser active layer;

first and second end-faces defined by said plural semiconductor layers, for emitting laser light;

plural stripe-like current injection areas formed in at least one of said plural semiconductor layers, each two adjacent ones of said current injection areas having a respective first distance therebetween at said first end-face and having a respective second distance, less than the respective first distance therebetween at said second end-face; and

plural electrodes for supplying current to said current injection areas, at least one of said electrodes having a stripe-

like portion formed corresponding to said current injection areas, and having a pad portion which has a width



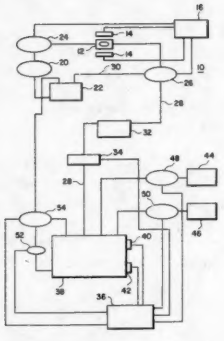
greater than a width of said stripe-like portion, said pad portion being for wire bonding, wherein said pad portion is formed in an area other than said current injection areas.

4,977,571

DYE LASER SOLUTION CIRCULATION SYSTEM

Horace W. Furumoto, Wellesley; Harry L. Ceccon, Boston, and James C. Hsia, Andover, all of Mass., assignors to Candela Laser Corporation, Wayland, Mass.

Filed Mar. 29, 1988, Ser. No. 174,729
Int. Cl.[5] H01S *3/20*
U.S. Cl. 372—54 **35 Claims**



1. A pumped active medium replenishment system for replenishing laser fluid after it has been degraded by activation comprising:

means for causing laser fluid to flow from a fluid source through a utilization chamber having means for periodically activating said laser fluid within the chamber, wherein during the activation period one or more laser fluid components are degraded by activation, interspersed with periods during which said laser fluid is not activated and not degraded, said utilization chamber having a laser fluid exit from which laser fluid continuously exits said utilization chamber after flowing therethrough;

means for intercepting the laser fluid exiting said utilization chamber, and for operating in synchronism with said means for periodically activating the laser fluid, for separating laser fluid exiting said utilization chamber into first and second output paths, said first output path containing the laser fluid activated by said activating means and said second output path containing fluid substantially unactivated by said activating means;

means for returning laser fluid in said second path to said laser fluid source;

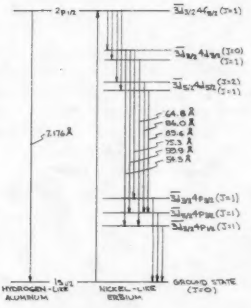
means for reconditioning laser fluid in said first path to substantially restore said laser fluid to its condition prior to activation by said activating means and for returning the reconditioned laser fluid to the laser fluid source.

4,977,572

RESONANTLY PHOTO-PUMPED NICKEL-LIKE ERBIUM X-RAY LASER

Joseph Nilsen, Livermore, Calif., assignor to The United States of America as represented by the Department of Energy, Washington, D.C.

Filed Mar. 29, 1990, Ser. No. 501,210
Int. Cl.[5] H01S *3/09*
U.S. Cl. 372—69 **7 Claims**



1. In a resonantly photopumped X-ray laser, enhancing the gain of several laser lines, comprising:

means for providing a quantity of nickel-like erbium ions in the J=0 ground state; and

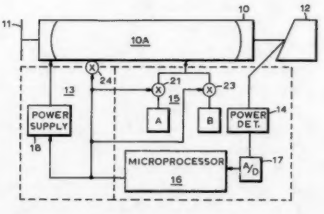
means for resonantly photo-pumping the quantity of nickel-like erbium ions from their J=0 ground state to $3d_{3/2}4f_{5/2}$ (J=1) level, which decays directly to upper laser states of said nickel-like erbium.

4,977,573

EXCIMER LASER OUTPUT CONTROL DEVICE

Steven N. Bittenson, Bedford, and Gary K. Klauminzer, Lexington, both of Mass., assignors to Questek, Inc., Billerica, Mass.

Filed Mar. 9, 1989, Ser. No. 321,631
Int. Cl.[5] H01S *3/097*
U.S. Cl. 372—81 **10 Claims**



1. An excimer laser unit comprising:

A. a laser resonant cavity;

B. a discharge chamber in said laser resonant cavity;

C. a first gas source connected to supply gas to said discharge chamber, said first source containing a mixture of a buffer gas and a rare gas in concentrations to provide a predetermined laser gain at a predetermined level of excitation;

D. a second gas source connected to supply gas to said discharge chamber, said second source containing a mix-

ture of the buffer gas and the rare gas in concentrations to provide said predetermined laser gain and a halogen in a concentration greater than that required to provide said predetermined laser gain at said predetermined level of excitation;

E. an electrical power supply connected to supply excitation energy to said discharge chamber, the laser unit producing in response to said excitation energy an associated output signal;

F. power detecting means responsive to said laser unit output signal, said power detecting means providing a signal which is indicative of the output power of the laser unit and related to the gain of said laser unit;

G. pressure measuring means for measuring the pressure in said discharge chamber;

H. control means responsive to the output signals of said power detecting means, said electrical power supply and the pressure measurements of said pressure measuring means for:

1. controlling the output of said power supply within a control range to maintain the predetermined laser gain, said control means increasing said output if the gain of the laser drops below a predetermined level and decreasing said output if the gain of the laser increases above a predetermined level,

2. when the power supply output signal is increased to a predetermined maximum level within said control range, controlling the supply of gas to said discharge chamber from said first gas source and said second gas source such that the concentrations of buffer gas, rare gas and halogen in the gas mixture in said discharge chamber provide a predetermined gain when excited by a power supply output within said control range, and

3. controlling the pressure in said discharge chamber by removing gas from said chamber until said pressure measuring means indicates that the pressure in said chamber is reduced to a predetermined level,

4. said control means controlling the output of said power supply to maintain the gain of the laser at the predetermined level until the power supply output signal reaches said maximum level, said control means then controlling the supply of gas to said discharge chamber such that the laser unit produces an associated output signal with said predetermined gain while the power supply is operating within the control range.

4,977,574

LASER OSCILLATOR

Norio Karube, Machida, Japan, assignor to Fanuc Ltd., Yamanashi, Japan

PCT No. PCT/JP89/00011, § 371 Date Aug. 21, 1989, § 102(e) Date Aug. 21, 1989, PCT Pub. No. WO89/06449, PCT Pub. Date Jul. 13, 1989

PCT Filed Jan. 6, 1989, Ser. No. 408,484

Claims priority, application Japan, Jan. 8, 1988, 63-2153

Int. Cl.[5] A01S *3/081*

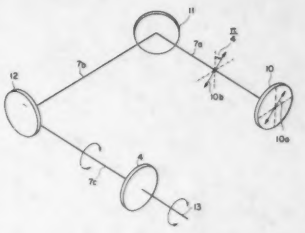
U.S. Cl. 372—93 **13 Claims**

1. A laser oscillator for oscillating a laser beam, said oscillator comprising:

an output coupling mirror;

a folding mirror operable as a phase retarder imposing $\pi/2$ phase delay with respect to parallel and perpendicular polarization components of said laser beam; and

a rear mirror having a maximum reflectivity with respect to a linear polarization component of said laser beam, said linear polarization component having an E vector a direction of which is rotated by a $\pi/4$ phase from an incident plane of the folding mirror.



4,977,575

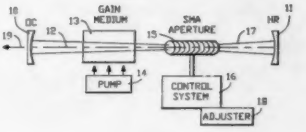
ADJUSTABLE APERTURE COMPRISING A SHAPE MEMORY ALLOY AND LASER USING SAME

Mark V. Ortiz, Mountain View, Calif., assignor to Spectra-Physics, Inc., Mountain View, Calif.

Filed Aug. 24, 1989, Ser. No. 398,005

Int. Cl.[5] H01S *3/08*

U.S. Cl. 372—103 **8 Claims**



1. An apparatus providing an aperture having an adjustable size, comprising:

a wire comprising a shape memory alloy, the wire having a first end, a second end and a length, and a shape along the length defining a perimeter of the aperture and responsive to current flow through the wire to vary the length;

control means, connected to the first and second ends of the wire, for supplying a controllable current through the wire to adjust the size of the aperture.

4,977,576

SAFETY FLOW STOPPER FOR WATER-COOLED ELECTRODE

Lyman T. Moore, Niagara Falls, and Mark D. Travers, Sanborn, both of N.Y., assignors to Great Lakes Carbon Corporation, New York, N.Y.

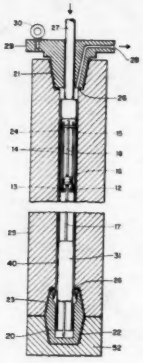
Continuation of Ser. No. 249,275, Sep. 22, 1988, abandoned, which is a continuation of Ser. No. 778,581, Sep. 20, 1985, abandoned. This application Apr. 10, 1989, Ser. No. 336,615

Int. Cl.[5] H05B *7/06*

U.S. Cl. 373—93 **27 Claims**

1. A composite water-cooled electrode assembly for an electric arc furnace comprising a hollow body having a central cavity and a water inlet tube within said cavity, the improvement a water flow stopper comprising a valve seat in said tube, a valve body shaped to obstruct or seal against said valve seat, and a release pin resting on the bottom of said cavity holding said valve body spaced apart from the valve seat and the valve

open during normal operation, said stopper actuated by failure of said assembly, releasing said pin and allowing said valve



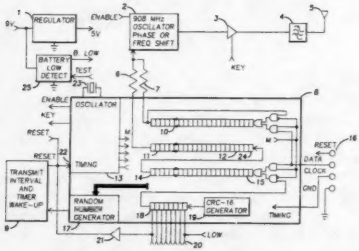
body to move against said valve seat and shut off the flow of cooling water.

4,977,577

WIRELESS ALARM SYSTEM

James D. Arthur, Costa Mesa, Calif.; H. Britton Sanderford, Jr., New Orleans, and Robert E. Rouquette, Kenner, both of La., assignors to Axonn Corporation, New Orleans, La.

Filed Nov. 2, 1988, Ser. No. 266,461
Int. Cl.[5] H04K *1/00*
U.S. Cl. 375—1 **14 Claims**



1. A spread spectrum transmitter comprising:

modulation means having an enable input and a moduation input, for modulating an RF signal with spread spectrum for reducing interference and providing code division multiple access in response to a modulating voltage being applied at the modulation input and an enable signal being applied at the enable input;

an RF power amplifier coupled to said modulating means, and having a keying input;

a bandpass filter coupled to said RF power amplifier;

an antenna coupled to said bandpass filter;

a microprocessor coupled to said modulation means and said RF power amplifier for controlling said modulation means and said RF power amplifier, respectively, said microprocessor including,

chip-code-generation means coupled to the modulation input of said modulation means for storing a spread spectrum chip code, and outputting, during a transmitting interval, the spread spectrum chip code as a modulating voltage to the modulation input of said modulating means;

a preamble register coupled to the modulation input of said modulation means for storing a preamble, and outputting, during the transmitting interval, the preamble as a modulating voltage to the modulation input of said modulation means;

an address register coupled to the modulation input of said said modulation means through said preamble register for storing a device address and a type code, and outputting, during the transmitting interval, the device address and type code as a modulating voltage to the modulation input of said modulation means;

a data register coupled to a data input and to the modulation input of said modulation means through said preamble register and said address register, for storing information data received from the data input, and outputting, during the transmitting interval, the information data as a modulating voltage to the modulation input of said modulation means;

error detection means coupled to said data register for generating error detection data from the preamble, device address and type code and the information data, wherein said error detection means is initialized with a value unique to each installation using said spread spectrum transmitter;

wherein said preamble register, said address register, said data register and said error detection means sequentially output the preamble, device address and type code, error detection data and information data to the modulation input and the spread spectrum chip code from said chip code generating means spreads the preamble, device address and type code, error detection data and information data to generate the spread spectrum of the RF signal, and wherein the preamble provides acquisition for spread spectrum synchronization for demodulating the spread spectrum of the RF signal;

a timing circuit coupled to the enable input of said modulation means and to the keying input of said RF power amplifier for enabling said modulation means and said RF power amplifier, by outputting an enable signal to the enable input of said modulation means and a keying signal to the keying input of said RF power amplifier, respectively, during the transmitting interval; and

a pseudorandom sequence generator coupled to said timing circuit for generating a random number for modifying the timing duration between each transmitting interval.

4,977,578

SPREAD SPECTRUM COMMUNICATION SYSTEM

Yukinobu Ishigaki, Machida, and Kenichi Mizuno, Yokohama, both of Japan, assignors to Victor Company of Japan, Ltd., Yokohama, Japan

Filed Feb. 21, 1989, Ser. No. 313,259
Claims priority, application Japan, Feb. 19, 1988, 63-37707; Feb. 19, 1988, 63-37708; Feb. 19, 1988, 63-37709; Feb. 22, 1988, 63-37629; Mar. 2, 1988, 63-49245; Mar. 16, 1988, 63-34897[U]
Int. Cl.[5] H04K *1/00*
U.S. Cl. 375—1 **23 Claims**

1. A spread spectrum communication system having a modulation unit for transmitting an information signal subjected to spread spectrum modulation, and a demodulation unit for detecting the information signal subjected to the spread spectrum modulation and transmitted as a radio wave, by despreading, wherein

said modulation unit comprises:

means for generating a primary modulated signal obtained by modulating a first carrier by said information signal;

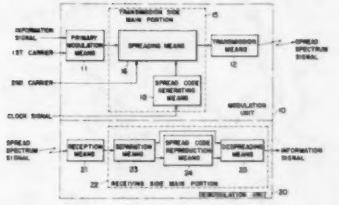
means for generating a spread code signal;

spreading means for generating a first spread signal by spreading said primary modulated signal by said spread code signal;

said spreading means generating a second spread signal by spreading a second carrier inputted thereto by said spread code signal; and

means for outputting said first and second spread signals and for transmitting thereof as a spread spectrum signal; and

said demodulation unit comprises:



separation means for separating each other said first and second spread signals inputted thereto as the spread spectrum signal transmitted by said outputting and transmitting means; and

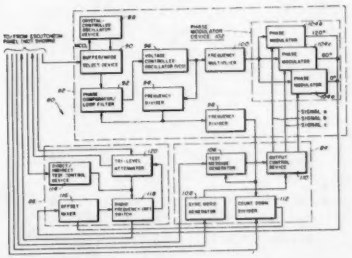
despreading means for despreading said first and second spread signals outputted separately from said separation means, by multiplying each other to obtain a signal substantially equivalent to the primary modulated signal.

4,977,579

TEST SET FOR A NAVIGATIONAL SATELLITE RECEIVER

Ray E. Bateman, Dayton, Md., assignor to The United States of America as represented by the Secretary of the Navy, Washington, D.C.

Filed Jun. 14, 1984, Ser. No. 620,659
Int. Cl.[5] H04B *3/46, 12/00*
U.S. Cl. 375—10 **10 Claims**



1. A satellite simulator section of a test set for detecting the reduced capabilities of an associated navigational satellite receiver, said satellite simulator section being configured to generate a facsimile of a predetermined navigational reference signal for testing and isolating faults in a receiver-processor section of the associated navigational satellite receiver, said satellite simulator section comprising:

a radio frequency (RF) portion for generating a predetermined reference signal, said RF portion being configured to phase delay the reference signal predetermined amounts;

a digital portion operatively connected to said RF portion, said digital portion being configured to generate a sequence of digital data for driving said RF protion so as, in coaction therewith, to cause the phase delay of the reference signal the predetermined amounts; and

an interface portion operatively connected to said RF portion, said interface portion being configured to interface between said RF portion and the associated navigational satellite receiver under test,

wherein said RF portion comprises:

a crystal-controlled oscillator device for generating a predetermined sine wave signal at its output;

a buffer/mode select device operatively connected to said crystal-controlled oscillator device for switching between the predetermined sine wave signal or an external sine wave signal from the associated navigational satellite receiver under test so as to furnish a conditioned signal at its output;

a phase-locked-loop (PLL) operatively connected to said buffer/mode select device, said PLL including a voltage controlled oscillator (VCO) having a signal at its output of a predetermined frequency, and said PLL being configured to maintain the predetermined frequency of the signal at the output of said VCO phase coherent with the conditioned signal at the output of said buffer/mode select device;

a frequency divider operatively connected at its input to said PLL and at its output to said digital portion for dividing down the signal at its input a predetermined amount;

a frequency multiplier operatively connected at its input to said VCO for multiplying the output of said VCO at the predetermined frequency to another predetermined frequency at the output of said frequency multiplier; and

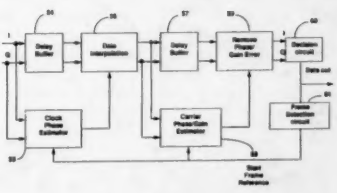
a phase modulator device operatively having an input connected to the output of said frequency multiplier, at another input to said digital portion and at its output to said interface portion so as to cause the phase delay of the reference signal the predetermined amounts.

4,977,580

TIMING AND CARRIER RECOVERY IN TDMA WITHOUT PREAMBLE SEQUENCE

John D. McNicol, Nepean, Canada, assignor to Northern Telecom Limited, Montreal, Canada

Filed Oct. 13, 1988, Ser. No. 256,958
Claims priority, application Canada, Aug. 15, 1988, 5748815
Int. Cl.[5] H04J *3/16*
U.S. Cl. 375—97 **16 Claims**



8. A method of detecting the clock phase and recovering the carrier of a TDMA signal in the absence of clock and carrier training preambles, comprising the steps of:

(a) storing for a predetermined amount of time digitally sampled quadrature baseband components of said TDMA signal;

(b) estimating the clock phase error of said quadrature baseband components;

(c) correcting the clock phase of said baseband components from the estimated clock phase error using interpolation over said digitally sampled quadrature baseband components;

(d) estimating the carrier phase error and the magnitude error of said clock phase corrected quadrature baseband components;

(e) correcting the carrier phase and magnitude of said clock phase corrected quadrature baseband components according to said estimated phase and magnitude error; and

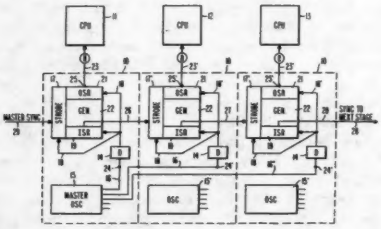
(f) forwarding said corrected clock and carrier signals to decision circuit means for providing demodulated data and to frame detection circuit means for providing a start frame reference signal.

4,977,581

MULTIPLE FREQUENCY CLOCK SYSTEM

Dominic Cerminara, Horsham, Pa., assignor to Unisys Corporation, Blue Bell, Pa.

Filed Aug. 18, 1988, Ser. No. 233,396
Int. Cl.[5] H04L 7/00
U.S. Cl. 375—107 **15 Claims**



1. A synchronous clock system for multiple processor configurations, comprising:

a plurality of clock systems, one for each processor, each providing multi-phase clock output signals,

each clock system having its own strobe unit and a multi-phase generator unit,

each strobe unit having a sync signal input and a data strobe output,

each said multi-phase generator unit having a strobe input, a plurality of phase signal outputs and an expansion sync output,

one of said clock systems being the master clock system having a master sync signal input which originates upon a system power ON condition and having a master expansion sync output, and

the other ones of said plurality of clock systems being slave clock systems, one of which has its strobe input coupled to the master expansion sync output of said master clock system and the other ones of said slave clock systems each having its strobe input coupled to an expansion sync output of another one of said slave clock systems.

4,977,582

SYNCHRONIZATION OF NON-CONTINUOUS DIGITAL BIT STREAMS

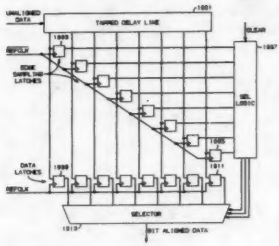
Robert K. Nichols, Glen Ellyn, and Bruce R. Zelle, Naperville, both of Ill., assignors to AT&T Bell Laboratories, Murray Hill, N.J.

Filed Mar. 31, 1988, Ser. No. 175,696
Int. Cl.[5] H04L 7/06
U.S. Cl. 375—118 **9 Claims**

1. Apparatus for deriving a non-continuous sequence of digital signal streams, each stream synchronized to a common clock, from a sequence of non-continuous unsynchronized digital signal streams, each unsynchronized stream having an arbitary phase with respect to said clock, without losing information of any pulse of any of said unsynchronized signal streams, comprising:

means for detecting time displacement between a time of transition of said clock and an initial time of transition of any of said non-continuous unsynchronized digital signal streams; and

means, responsive to said means for detecting, for delaying said any unsynchronized digital signal stream to generate one of said synchronized digital signal streams without



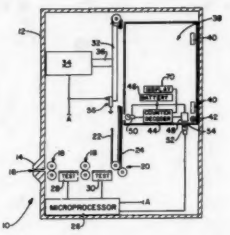
losing information of any pulse of said any unsynchronized signal stream.

4,977,583

CASSETTE CASH BOX FOR CURRENCY VALIDATOR

Robert L. Gorgone, Mentor, Ohio, assignor to Ardac, Inc., Eastlake, Ohio

Filed Apr. 3, 1989, Ser. No. 332,024
Int. Cl.[5] B07C 5/342; B65B 35/50
U.S. Cl. 377—8 **15 Claims**



1. The improvement in a currency validator of a cash box, comprising:

a receptacle having an opening for receiving paper currency therethrough;

recordation means maintained by said receptacle for tallying a number of pieces of paper currency received by said receptacle;

locking means for selectively securing said receptacle to the currency validator and selectively disengaging said receptacle therefrom for removal of said receptacle from the currency validator;

a first photodetector received by said receptacle, said first photodetector receiving an optical signal from a first light source maintained by the currency validator, converting said optical signal to an electrical signal, and applying said electrical signal to said counter;

a second light source maintained within said receptacle and interconnected with said counter; and

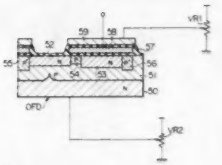
a fixture adapted to receive said receptacle when said receptacle is removed from the currency validator, said fixture having a third light source positioned for communication with said first photodetector, and a second photodetector positioned for communication with said second light source.

4,977,584

CCD IMAGE SENSOR WITH VERTICAL OVERFLOW DRAIN

Akiyoshi Kohno, and Atsushi Mikoshiba, both of Tokyo, Japan, assignors to NEC Corporation, Tokyo, Japan

Filed Oct. 23, 1989, Ser. No. 425,140
Claims priority, application Japan, Oct. 21, 1988, 63-266539
Int. Cl.[5] G11C *19/28;* H01L *29/78;* H04N *3/14*
U.S. Cl. 377—58 12 Claims



1. An image sensor of an interline transfer type fabricated on a semiconductor substrate of a first conductivity type and established into an electronic shutter mode and a charge transferring mode of operation, comprising:

(a) a plurality of photo sensing elements arranged in rows and columns and operative to accumulate effectual electric charges in said electronic shutter mode of operation and ineffectual electric charges out of the electronic shutter mode of operation in the presence of optical images, said photo sensing elements being formed by a plurality of impurity regions of said first conductivity type defined in a well of a second conductivity type provided in said semiconductor substrate;

(b) a plurality of vertical shift registors coupled to the columns of said photo sensing elements, respectively, and operative to receive said effectual electric charges from said photo sensing elements in the presence of a read out signal produced in a vertical blanking time period and to transfer said effectual electric charges in response to a multiple-phase vertical transferring signal in said charge transferring mode of operation, said vertical shift registors being formed in said well;

(c) a horizontal shift registor coupled to said vertical shift registors for transferring said effectual electric charges fed from said vertical shift registors in response to a multiple-phase horizontal transferring signal;

(d) a pulse producing unit operative to produce said multiple-phase vertical transferring signal, said multiple phase-horizontal transferring signal, a vertical driving signal and a horizontal driving signal;

(e) a conductive photo shield plate provided over said well and having an opening exposing said photo sensing elements to said optical images; and

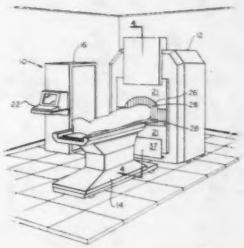
(f) a biasing voltage controlling unit responsive to said vertical and horizontal driving signals for producing first and second biasing signals and operative to respectively supply said first and second biasing signals to said photo shield plate and said semiconductor substrate before producing said read out signal, said electronic shutter mode of operation being established in a lapse of time from recoveries of said first and second biasing voltage signals to a production of said read out signal, in which a vertical overflow drain is formed by a combination of said semiconductor substrate, said well and said impurity regions, and in which said first and second biasing voltage signals have respective first voltage levels selected in such a manner that punch through phenomena take place in said vertical overflow drain for sweeping said ineffectual electric charges into said semiconductor substrate.

4,977,585

SELF SHIELDED COMPUTERIZED TOMOGRAPHIC SCANNER

Douglas P. Boyd, San Mateo County, Calif., assignor to Imatron, Inc., South San Francisco, Calif.

Filed Apr. 5, 1989, Ser. No. 334,076
Int. Cl.[5] G01N *23/00*
U.S. Cl. 378—4 3 Claims



1. In a compact computerized tomographic x-ray scanner of the type including a gantry having spaced faces and a patient tunnel extending between said faces, an x-ray tube in said gantry to project an x-ray beam across said tunnel, a detector array in said gantry for receiving x-rays and providing output signals representative of transmission, a patient couch for introducing a patient into said tunnel, and a signal processing system for receiving the output signal form said detector array providing an image of a section of a patient body placed in the tunnel, the improvement comprising:

a layer of x-ray shielding material forming a lining for said tunnel; and

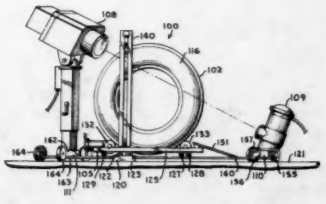
a layer of x-ray shielding material disposed at each of said faces to define with said tunnel a shielded enclosure which shields the surrounds form x-ray scattered by a patient and couch within the enclosure, each curtain comprising two parts movable towards and away from one another whereby the parts are moved away from one another to allow the patent to be introduced into the tunnel and moved towards one another to engage the couch and patient to define the enclosure.

4,977,586

PORTABLE TIRE X-RAY APPARATUS AND METHOD

Leonard O. Curry, 8363 Nieman Rd., Lenexa, Kans. 66214

Continuation-in-part of Ser. No. 60,724, Jun. 10, 1987, Pat. No. 4,839,914. This application Jun. 12, 1989, Ser. No. 365,135
Int. Cl.[5] G01N *23/04*
U.S. Cl. 378—61 6 Claims



2. A tire inspection apparatus comprising:

(a) a support frame for supporting a tire to be inspected; said support frame including a base adapted to be supported by a floor and a pair of support beams positioned above said

base and extending outwardly in opposite directions therefrom;

(b) a pair of rollers rotatably connected and extending between said support beams near opposite ends thereof and in general parallel relationship to one another;

(c) rotary motor means selectively rotating at least one of said rollers and operable to allow selective rotation of said one of said rollers under the control of an operator;

(d) a ramp positioned extending downwardly from said support beams so as to facilitate placement of a tire from a location on a floor supporting the apparatus to between said rollers;

(e) a pair of tire guides; each of said tire guides being attached to said frame and including stanchions extending upwardly therefrom; each of said stanchions having attached to an upper end thereof an adjustable roller for engaging a tire and allowing rotation of such a tire;

(f) an x-ray source adapted to provide a source of x-rays;

(g) a first support carrier operably supporting said x-ray source and including a mobile support carriage;

(h) a fluoroscope adapted to receive x-rays from said x-ray source;

(i) a second support carrier operably supporting said fluoroscope and including a mobile support carriage; and

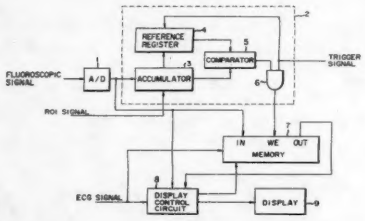
(j) a pivot beam connected to said first support carrier and said second support carrier; said pivot beam also being medially connected to said frame by a pivot pin allowing rotation of said pivot beam about said pivot pin; whereby said fluoroscope and said x-ray source are aligned with one another by said pivot beam and an operator may selectively swing said fluoroscope and said x-ray source about an axis passing through said pivot pin and position said x-ray source and said fluoroscope in at least two selected positions relative to a tire being inspected for inspection of opposite sides of the tire without requiring removal of the tire from the apparatus.

4,977,587

X-RAY IMAGE PROCESSING APPARATUS

Michitaka Honda, Nishinasunomachi, Japan, assignor to Kabushiki Kaisha Toshiba, Kawasaki, Japan

Continuation of Ser. No. 236,750, Aug. 26, 1988, abandoned.
This application Apr. 19, 1990, Ser. No. 512,512
Claims priority, application Japan, Aug. 28, 1987, 62-214734
Int. Cl.[5] H05G *1/64*
U.S. Cl. 378—99 **14 Claims**



1. An X-ray image processing apparatus comprising:

means for detecting the brightness of each frame of an X-ray image which is supplied from an x-ray image apparatus;

means for comparing the brightness detected with a predetermined level in order to detect, on the basis of the comparison result, a first timing at which a blood vessel image becomes visible due to a contrast medium being injected into the blood vessel and a second timing at which the blood vessel image becomes non-visible;

first memory means, for storing the frames of an X-ray image supplied from the X-ray image apparatus, during the time period from the first timing to the second timing, the X-ray image having the blood vessel image being written into the first memory means; and

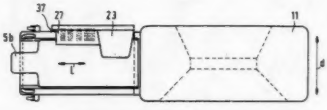
display means for displaying the X-ray image stored in said first memory means.

4,977,588

X-RAY EXAMINATION APPARATUS

Adrianus Van der Ende, Eindhoven, Netherlands, assignor to U.S. Philips Corporation, New York, N.Y.

Filed Mar. 12, 1990, Ser. No. 493,032
Claims priority, application Netherlands, Mar. 16, 1989, 8900638
Int. Cl.[5] A61B *6/00*; H05G *1/02*
U.S. Cl. 378—196 **10 Claims**



10. An X-ray examination apparatus comprising:

a base having a length and a width dimension;

a patient table secured to the base having first and second patient carrying portions spaced along said length dimension;

means for rotatably securing the first portion to fold over the second portion in an apparatus transport mode and to extend co-extensive with the first portion along said length dimension in an examination mode;

support means pivotally secured to the base adjacent to the first portion when extended and having a first transport mode and a second examination mode; and

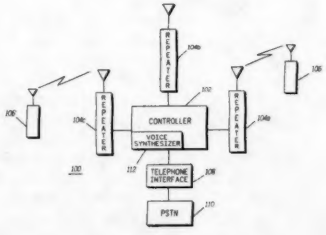
X-ray source means and X-ray detector means secured to the support means for rotation about an object in a trajectory plane normal to said length dimension for irradiating the object with a radiation slice, said source means and detector means having a width dimension transverse said plane about the same as said base width dimension and a length dimension parallel to said plane substantially greater than said base width dimension, said support means being arranged so that the plane is transverse said base length dimension in said examination mode and parallel to said base length dimension in said transport mode.

4,977,589

SIGNALLING AND CONTROL PROTOCOL FOR A COMMUNICATION SYSTEM

Brian K. A. Johnson, and Stelios J. Patsiokas, both of Plantation, Fla., assignors to Motorola, Inc., Schaumburg, Ill.

Filed Nov. 25, 1988, Ser. No. 275,876
Int. Cl.[5] H04B *7/26*
U.S. Cl. 379—58 **32 Claims**



1. In a two-way communication system having a central station for allocating at least one communication channel

among a plurality of subscriber units, a signalling and control method for limiting the duration of a transmission by a subscriber unit, comprising the steps of:

at a radio subscriber unit:

(a) transmitting a message representing a request to communicate;

(b) receiving a code representing a time duration during which said radio subscriber unit may communicate; and,

(c) communicating for a time interval not exceeding said time duration.

4,977,590

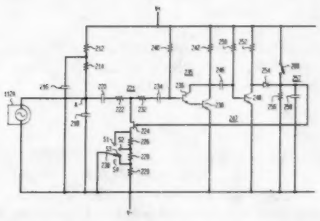
SIGNAL LEVEL EXPANSION APPARATUS AS FOR A TELECOMMUNICATIONS SYSTEM

Slavko Milovancevic, Mesa, Ariz., assignor to Executone Information Systems, Inc., Scottsdale, Ariz.

Filed May 26, 1989, Ser. No. 358,245

Int. Cl.[5] H04M *1/60*

U.S. Cl. 379—395 **13 Claims**



1. A signal level expansion system comprising:

means for applying an input signal;

variable attenuator means, coupled to receive said input signal and responsive to a control signal, for providing an output signal representing a reduced-amplitude version of said input signal;

amplifier means, coupled to said variable attenuator means for amplifying the signal provided thereby;

signal detection means, coupled to said amplifier means and responsive to the amplitude of the signals provided thereby for generating said control signal including:

a switch, coupled to said amplifier means, to a source of operating potential and to a source of reference potential and biased to establish a conduction path between said source of operating potential and said source of reference potential, wherein said switch is responsive to the amplitude of the signal provided by said amplifier means being above a threshold value for increasing the impedance of the conduction path between the source of operating potential and the source of reference potential; and

means, coupled to said switch, for generating said control signal, said generated control signal being in a state which acts to decrease the level of attenuation provided by the variable attenuation means when the switch exhibits said increased impedance.

4,977,591

DUAL MODE LMS NONLINEAR DATA ECHO CANCELLER

Walter Y. Chen, Brookside, N.J., and Richard A. Haddad, Tuxedo, N.Y., assignors to NYNEX Corporation, New York, N.Y.

Filed Nov. 17, 1989, Ser. No. 438,598

Int. Cl.[5] H04M *1/00*

U.S. Cl. 379—410 **14 Claims**

1. An echo canceller for cancelling an echo signal comprising

means operative during a training period and using a least mean square algorithm to estimate a finite impulse response of a linear component of an echo path, and

means operative during a subsequent dual mode phase and using a least mean square algorithm for estimating both a nonlinear function representative of a nonlinear compo-

nent of said echo path and said finite impulse response of said linear component of said echo path,

wherein said means operative during said dual mode phase alternately estimates said nonlinear function and said finite impulse response.

4,977,592

DISPENSER AND UNLATCHING MECHANISM FOR A HAND-HELD PAY STATION TELEPHONE

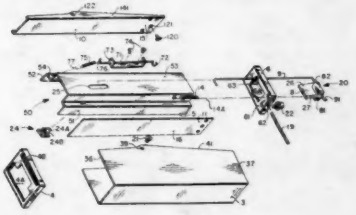
Edward J. Hollowed, Naperville, and Jerome L. Oldani, Aurora, both of Ill., assignors to GTE Airfone Incorporated, Oak Brook, Ill.

Filed Feb. 27, 1989, Ser. No. 278,391

The portion of the term of this patent subsequent to Oct. 23, 2007, has been disclaimed.

Int. Cl.[5] H04M *1/11, 17/02*

U.S. Cl. 379—428 **30 Claims**



23. For operation in conjunction with a hand-held telephone and with an armrest retainable dispenser for the telephone, a credit-card unlatching mechanism ("CCUM") comprising:

a face plate disposed in proximity with the dispenser and providing a first opening for access to the hand-held telephone and a second opening for the insertion of a credit card;

a pivotably mounted latching mechanism disposed rearwardly from said first and said second opening in said face plate and comprising a latching arm, said latching mechanism predisposed in a latching orientation with respect to said dispenser so that said latching arm is positioned to secure a hand-held telephone in said dispenser;

a retention mechanism attached between said dispenser and said latching mechanism for predisposing said latching mechanism in the above-mentioned latching orientation; and

a latch-release actuator interposed between said face plate second opening and said latching mechanism and mechanically connected to said latching mechanism, so that a credit card inserted through said second opening in the direction of said latch-release actuator and abutted against said latch-release actuator operates to cause a pivotal motion of said latching mechanism into an unlatching orientation, whereby said latching arm is positioned to permit the release of said hand-held telephone from said dispenser.

4,977,593

OPTICAL COMMUNICATIONS NETWORK

John W. Ballance, Woodbridge, England, assignor to British Telecommunications plc, London, England

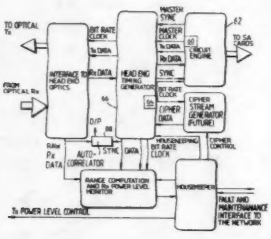
PCT No. PCT/GB88/01037, § 371 Date May 21, 1990, § 102(e) Date May 21, 1990, PCT Pub. No. WO89/05069, PCT Pub. Date Jun. 1, 1989

PCT Filed Nov. 28, 1988, Ser. No. 488,048

Claims priority, application United Kingdom, Nov. 27, 1987, 8727846

Int. Cl.[5] H04K 1/00; H04L 9/02

U.S. Cl. 380—2 6 Claims



1. A central station for a digital communications network comprising a plurality of outstations and a branch network of waveguides comprising a single waveguide from the central station, one or more passive splitters and two or more secondary waveguides for bidirectional transmission to and from the outstations: the central station comprising transmitting means for transmitting data to outstations in the form of a stream of frames, each comprising a synchronisation signal in the form of a predetermined pattern of bits; and characterised by scrambling means for scrambling the synchronisation signal and at least some of the data bits of each of the frames in accordance with a predetermined binary sequence; and by means for detecting in data received from the outstations the presence of the scrambled synchronisation signal thereby obtaining information concerning reflections in the branch network.

4,977,594

DATABASE USAGE METERING AND PROTECTION SYSTEM AND METHOD

Victor H. Shear, Bethesda, Md., assignor to Electronic Publishing Resources, Inc., Bethesda, Md.

Division of Ser. No. 918,109, Oct. 14, 1986, Pat. No. 4,827,508.

This application Feb. 16, 1989, Ser. No. 310,938

The portion of the term of this patent subsequent to May 2, 2006, has been disclaimed.

Int. Cl.[5] H04K 1/00

U.S. Cl. 380—4 57 Claims

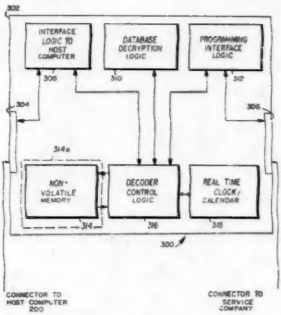
21. A secure data base access system comprising:

at least one storage medium storing at least one textual database in encrypted form, said at least one database including at least one collection of textual information, said at least one storage medium also storing index information, said index information correlating portions of said at least one encrypted database with search information;

at least one host signal processor, operatively connected to said at least one storage medium, said at least one processor preprogrammed so as to: (a) accept search criteria in response to user input thereto, (b) search said index information, (c) identify, in accordance with said search of index information, the portions of said at least one encrypted database which satisfy said search criteria, and (d) read at least one of said identified encrypted database portions from said at least one storage medium;

means for decrypting at least one read portion of said encrypted at least one database to produce corresponding decrypted information; and

decoder control logic means, coupled to said host at least one processor, and said decrypting means, for measuring the percentage of at least one information collection decrypted by said decrypting means, said decoder control



logic means including means for preventing decryption of more than at least one predetermined percentage of said at least one information collection.

4,977,595

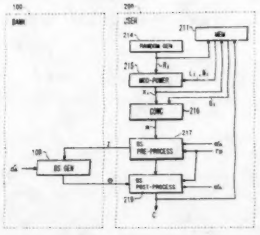
METHOD AND APPARATUS FOR IMPLEMENTING ELECTRONIC CASH

Kazuo Ohta, Zushi, and Tatsuaki Okamoto, Yokosuka, both of Japan, assignors to Nippon Telegraph and Telephone Corporation, Tokyo, Japan

Filed Mar. 28, 1990, Ser. No. 500,555

Int. Cl.[5] H04L 9/30

U.S. Cl. 380—24 54 Claims



52. An electronic cash implementing user system in which a bank issues electronic cash to a user and the user pays to a third party with said electronic cash, comprising:

secret information generating means for generating secret information containing identification information;

user information generating means whereby user information is produced, by use of a first one-way function, from said secret information provided from said secret information generating means;

first blind signature preprocessing means whereby information containing said user information provided from said user information generating means is subjected to one-way blind signature preprocessing to produce randomized user information;

first blind signature postprocessing means whereby signed randomized user information produced by signing said randomized user information by said bank is derandomized to obtain signed user information;

secret random information generating means for generating secret random information;

authentication information generating means whereby au-

thentication information is produced, by use of a second one-way function, from said secret random information provided from said secret random information generating means;

second blind signature preprocessing means whereby said authentication information provided from said authentication information generating means is subjected to one-way blind signature preprocessing to obtain randomized authentication information;

second blind signature postprocessing means whereby signed authentication information produced by signing said randomized authentication information by said bank is derandomized to obtain signed authentication information; and

response generating means whereby a response is produced by use of said secret random information in response to an inquiry from said third party.

4,977,596

CRYPTOGRAPHIC SYNCHRONIZATION RECOVERY BY MEASURING RANDOMNESS OF DECRYPTED DATA

Joseph H. Maestas, and Lyndon G. Pierson, both of Albuquerque, N. Mex., assignors to The United States of America as represented by the United States Department of Energy, Washington, D.C.

Filed Mar. 15, 1989, Ser. No. 323,923

Int. Cl.[5] H04L 9/00

U.S. Cl. 380—48 14 Claims

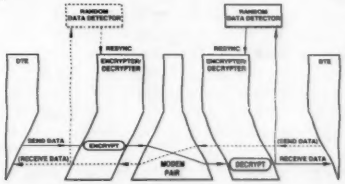


FIGURE 1 - CRYPTOGRAPHIC SYNCHRONIZATION RECOVERY BY DETECTION OF RANDOM BIT SEQUENCES

1. A method of cryptographic synchronization recovery during transmission of an encrypted digital data message comprising receiving said encrypted digital data message through an incoming data path, decrypting said digital data message, monitoring a randomness of said decrypted digital data message, and resynchronizing said incoming data path when said randomness of said decrypted digital data message falls within a predetermined range.

4,977,597

STEREO RECEIVER CIRCUIT

Manfred L. A. Hori, Hamburg, Fed. Rep. of Germany, assignor to U.S. Philips Corp., New York, N.Y.

Filed Jul. 18, 1989, Ser. No. 381,618

Claims priority, application Fed. Rep. of Germany, Jul. 22, 1988, 3824890

Int. Cl.[5] H04H 5/00

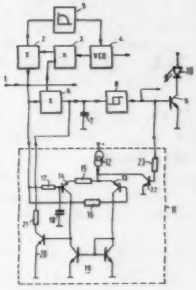
U.S. Cl. 381—11 3 Claims

1. A stereo receiver circuit for processing a multiplex signal comprising a pilot signal by means of a pilot signal detector (6, 7) which detects frequency components in the multiplex signal at the frequency of the pilot signal and which controls a Schmitt trigger (8) for influencing the mono-stereo operation, said circuit also comprising a control circuit (11) capturing the noise components in the multiplex signal and acting on the Schmitt trigger, characterized in that

the control circuit (11) is only active in the mono operation and influences the input signal of the Schmitt trigger (8) in the case of reception of sufficiently strong noise components to such an extent that said Schmitt trigger remains in its switching state for mono operation;

the control circuit (11) comprising a high-pass filter circuit which substantially suppresses the useful frequencies in the multiplex signal;

the high-pass filter circuit is constituted by a differential amplifier (12 . . . 15), one input of which receives the multiplex signal in an unfiltered form and the other input of which receives the multiplex signal via a low-pass filter (17, 18); and



the differential amplifier comprises two transistors (13, 14) whose bases receive the output signal of the low-pass filter (17, 18) and the unfiltered multiplex signal and whose emitter current is supplied by a current source (12) which is connected via a resistor (15) to the emitter of the transistor (14) connected to the low-pass filter (17, 18) and is directly connected to the emitter of the other transistor (13).

4,977,598

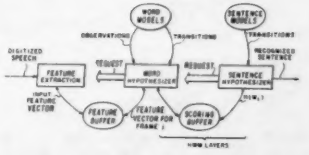
EFFICIENT PRUNING ALGORITHM FOR HIDDEN MARKOV MODEL SPEECH RECOGNITION

George R. Doddington, Richardson, and Basavaraj I. Pawate, Dallas, both of Tex., assignors to Texas Instruments Incorporated, Dallas, Tex.

Filed Apr. 13, 1989, Ser. No. 337,608

Int. Cl.[5] G10L 7/08

U.S. Cl. 381—43 8 Claims



1. A method for reducing loading of a central processing unit during speech recognition involving hierarchical layers of grammar and wherein models of those hierarchical layers employ a plurality of states including at least a start state and a stop state, only one of said plurality of states at any time being designated the current state, comprising:

(a) computing a score for the information-bearing current state;

(b) comparing said score against a predetermined threshold value to determine whether said information-bearing current state should be retained;

(c) locating an available slot in a scoring buffer having at least one slot;

(d) storing information regarding said current state in said available slot;

(e) setting a scoring buffer slot backpointer;
(f) assigning a last-time field value in said available slot equal to a current time-index of the central processing unit;
(g) propagating a time value equal to said current time-index back to all scoring buffer slots along a best path leading to said available slot containing information about said current state;
(h) parsing a next current state; and
(i) repeating steps (a) through (h) until all states have been completed.

4,977,599

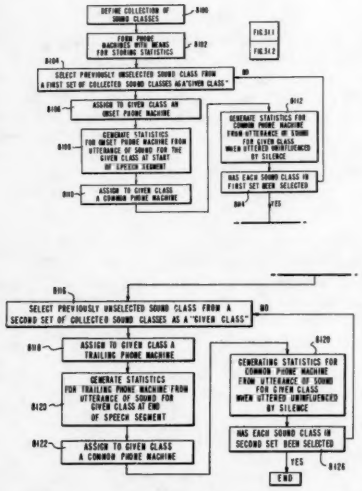
SPEECH RECOGNITION EMPLOYING A SET OF MARKOV MODELS THAT INCLUDES MARKOV MODELS REPRESENTING TRANSITIONS TO AND FROM SILENCE

Lalit R. Bahl, Amawalk; Peter V. DeSouza; Robert L. Mercer, both of Yorktown Heights, and Michael A. Picheny, White Plains, all of N.Y., assignors to International Business Machines Corporation, Armonk, N.Y.

Continuation of Ser. No. 738,912, May 29, 1985, abandoned. This application Dec. 15, 1988, Ser. No. 289,447

Int. Cl.[5] G10L *5/04*

U.S. Cl. 381—43 **19 Claims**


DEFINE COLLECTION OF SOUND CLASSES
FROM PHONE MACHINES INTO MEANS FOR STORING STATISTICS
SELECT PREVIOUSLY UNSELECTED SOUND CLASS FROM A FIRST SET OF COLLECTED SOUND CLASSES AS A "GIVEN CLASS"
ASSIGN TO GIVEN CLASS AN ONSET PHONE MACHINE
GENERATE STATISTICS FOR ONSET PHONE MACHINE FROM UTTERANCE OF SOUND FOR THE GIVEN CLASS AT START OF SPEECH SEGMENT
ASSIGN TO GIVEN CLASS A COMMON PHONE MACHINE
GENERATE STATISTICS FOR COMMON PHONE MACHINE FROM UTTERANCE OF SOUND FOR GIVEN CLASS WHEN UTTERED UNINFLUENCED BY SILENCE
HAS EACH SOUND CLASS IN FIRST SET BEEN SELECTED
YES
SELECT PREVIOUSLY UNSELECTED SOUND CLASS FROM A SECOND SET OF COLLECTED SOUND CLASSES AS A "GIVEN CLASS"
ASSIGN TO GIVEN CLASS A TRAILING PHONE MACHINE
GENERATE STATISTICS FOR TRAILING PHONE MACHINE FROM UTTERANCE OF SOUND FOR GIVEN CLASS AT END OF SPEECH SEGMENT
ASSIGN TO GIVEN CLASS A COMMON PHONE MACHINE
GENERATING STATISTICS FOR COMMON PHONE MACHINE FROM UTTERANCE OF SOUND FOR GIVEN CLASS WHEN UTTERED UNINFLUENCED BY SILENCE
HAS EACH SOUND CLASS IN SECOND SET BEEN SELECTED
YES
END

1. In a speech recognition system having an acoustic processor which generates successive labels selected from an alphabet of labels in response to a spoken input wherein the labels are selected based on at least one predefined characteristic and wherein said predefined characteristic varies for at least one given sound depending on whether the sound is located adjacent to a period of silence or not, a method of forming baseforms for words comprising the steps of:

forming, for said one given sound, a plurality of different phone machines including a phone machine corresponding to said given sound being uttered adjacent to a period of silence and a phone machine corresponding to said given sound being uttered detached from silence, wherein each phone machine is characterizable as (i) a plurality of states, (ii) a plurality of transitions each of which extends from a state to a state, (iii) means for storing a probability for each transition, and (iv) means for storing label output probabilities, each label output probability corresponding to the probability of said each phone machine producing a particular label at an identified transition;

the probabilities for a given phone machine being determined from utterances of a sound corresponding thereto.

4,977,600

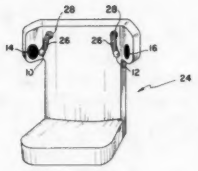
SOUND ATTENUATION SYSTEM FOR PERSONAL SEAT

Eldon W. Ziegler, Columbia, Md., assignor to Noise Cancellation Technologies, Inc., Columbia, Md.

Filed Jun. 7, 1988, Ser. No. 203,114

Int. Cl.[5] G10K *11/16*

U.S. Cl. 381—71 **16 Claims**



1. An active noise attenuation system for attenuating selected noise at selected areas about an individual comprising:

synchronization means for producing a synchronization signal for a source of noise to be attenuated;

first and second acoustic actuators respectively mounted proximate each ear of the individual;

first and second acoustic sensors respectively mounted between a corresponding one of said first and second acoustic actuators and a respective ear of the individual to be adjustably positionable in a lateral direction between said first and second acoustic actuators and the respective ear of the individual to accurately sense the sound adjacent the respective ear; and

control means for independently controlling said first and second acoustic actuators using said synchronization signal and sounds sensed by the respective said first and second acoustic sensors to cancel the noise from said source of noise in a selected area limited to the individual without adversely affecting other locations in the vicinity.

4,977,601

METHOD OF RECOGNIZING A FINGERPRINT

Wieslaw Bicz, Mainz, Fed. Rep. of Germany, assignor to Werner Pritzl and Bernd Wegener, both of, Fed. Rep. of Germany, a part interest

PCT No. PCT/DE87/00134, § 371 Date Nov. 27, 1987, § 102(e) Date Nov. 27, 1987, PCT Pub. No. WO87/05790, PCT Pub. Date Oct. 8, 1987

PCT Filed Mar. 26, 1987, Ser. No. 135,028

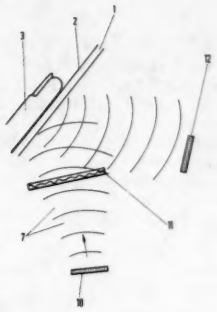
Claims priority, application Fed. Rep. of Germany, Mar. 27, 1986, 3610397

Int. Cl.[5] G06K *9/00*

U.S. Cl. 382—4 **20 Claims**

1. Method of recognizing fingerprints and similar skin surface structures in which the structure of a finger surface placed on a smooth surface is scanned and compared with a characteristic structure stored on a record carrier, characterized in that the structure of the finger surface is scanned with soundwaves generated by an ultrasound source, the soundwaves being directed through a liquid and/or solid body at least from the ultrasound source to the smooth surface and being directed

through the smooth surface to the finger surface, the sound-wave structure obtained being transformed to suitable evalua-



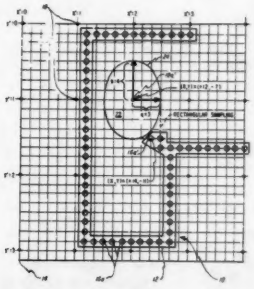
tion characteristics and being compared with the stored characteristic structure.

4,977,602

CHARACTER NORMALIZATION USING AN ELLIPTICAL SAMPLING WINDOW FOR OPTICAL CHARACTER RECOGNITION

Louis J. Beato, Rochester, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y.

Filed Nov. 20, 1989, Ser. No. 439,222
Int. Cl.[5] G06K 9/56
U.S. Cl. 382—27 **16 Claims**



1. In an optical character recognition system in which a text image comprising a plurality of characters is separated into plural individual character images, each of said individual character images comprising an array of original pixels of dimensions x_{max} and y_{max} in respective orthogonal directions, each of said pixels being one of a plurality of pixel values, a character normalization device for normalizing each of said individual character images to a size $X_{max}=Ax_{max}$ and $Y_{max}=By_{max}$ in said respective orthogonal directions in accordance with orthogonal normalization ratios A and B respectively, A and B being any real numbers, comprising:

means for defining a set of normalized image pixel locations, said normalized image pixel locations having a pitch relative to said original pixels in each of said orthogonal directions corresponding to said orthogonal normalization ratios A and B, respectively;

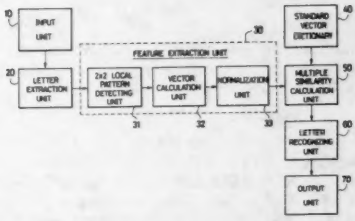
means for computing a value for each one of said normalized pixel locations from the values of the original pixels which lie within an elliptical neighborhood surrounding said one normalized pixel location, whereby to compute a set of normalized pixel location values defining a normalized individual character image.

4,977,603

METHOD AND APPARATUS FOR A PATTERN RECOGNITION

Bunpei, Irie Suita, and Haruo Asada, Yokohama, both of Japan, assignors to Kabushiki Kaisha Toshiba bisha, Kawasaki, Japan

Filed Jan. 9, 1989, Ser. No. 294,649
Claims priority, application Japan, Jan. 8, 1988, 63-7930
Int. Cl.[5] G06K 9/68
U.S. Cl. 382—34 **6 Claims**



1. An apparatus for pattern recognition of a pattern constituted by an arrangement of black picture elements on a background constituted by white picture elements comprising:

means for counting a number of occurrences within each one of localized regions of local patterns indicating possible arrangements of the white and black picture elements, the localized regions subdividing the pattern:

means for deriving a vector quantity indicating distribution of black picture elements on a basis of the numbers of occurrences of the local patterns for each one of the localized regions counted by the counting means;

means for calculating multiple similarity defined in terms of the square of the inner product of the vector quantity derived by the deriving means and each one of prescribed standard vectors representing one of prescribed standard patterns;

means for recognizing the pattern by identifying the pattern with one of the standard patterns for which the multiple similarity calculated by the calculating means is maximum.

4,977,604

METHOD AND APPARATUS FOR PROCESSING SAMPLED DATA SIGNALS BY UTILIZING PRECONVOLVED QUANTIZED VECTORS

Douglas M. Chabries, Salem, and Richard W. Christiansen, Highland, both of Utah, assignors to Unisys Corporation, Blue Bell, Pa.

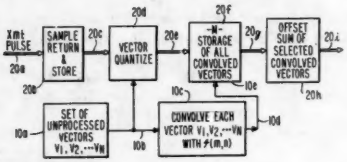
Filed Feb. 17, 1988, Ser. No. 157,199
Int. Cl.[5] G06K 9/64
U.S. Cl. 382—42 **17 Claims**

1. An electronic system for processing sampled data input signals, which is comprised of:

an electronic memory means which stores a set of preprocessed vectors V_1*f(m, . . .) thru V_n*f(m, . . .) where f(m, . . .) is a sampled data function having any number of dimensions m, . . . , * is a convolution operator, and V_1 thru V_N are a finite set of N unprocessed vectors each of which represents an anticipated group of input signal samples;

a means for generating a sequence of samples from an input signal that is to be processed and for compressing said sequence of samples into a smaller sequence of index signals that correspond to the indexes 1 thru N of said unprocessed vectors;

a means for receiving said smaller sequence of index signals and for reading form said memory means, those preprocessed vectors whose indexes match the received index signals; and,


Xmit PULSE
SAMPLE RETURN & STORE
VECTOR QUANTIZE
-M- STORAGE OF ALL CONVOLVED VECTORS
OFFSET SUM OF SELECTED CONVOLVED VECTORS
SET OF UNPROCESSED VECTORS V1, V2, ···VN
CONVOLVE EACH VECTOR V1, V2, ···VN WITH F(m,n)

a means for adding together the read preprocessed vectors while maintaining a predetermined offset between them as they are added.

4,977,605

BINARY QUANTIFICATION OF AN IMAGE HAVING MULTIPLE LEVELS OF GREYS

Michel G. J. Fardeau, Les Milles, and Bruno J. M. Adamolle, Aix-En-Provence, both of France, assignors to Bertin & Cie, Plaisir, France

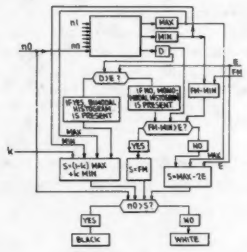
PCT No. PCT/FR87/00368, § 371 Date May 27, 1988, § 102(e) Date May 27, 1988, PCT Pub. No. WO88/02587, PCT Pub. Date Apr. 7, 1988

PCT Filed Sep. 28, 1987, Ser. No. 207,051

Claims priority, application France, Sep. 30, 1986, 86 13577

Int. Cl.[5] G06K *9/38*

U.S. Cl. 382—51 **11 Claims**



1. A process for transforming an initial video-type image having multiple grey levels into a binary image comprising:

(a) establishing a representation of grey levels of a partial image which is centered on a pixel of an initial video-type image with said partial image comprising a plurality of pixels in at least one dimension,

(b) processing said representation of said grey levels to determine whether the distribution of said grey levels of said partial image corresponds to a monomodal or a bimodal histogram,

(c) selecting a threshold such that (1) when said distribution of said grey levels is concluded to be a bimodal histogram, said threshold is within a range between the highest and the lowest grey levels and (2) when said distribution of said grey levels is concluded to be a monomodal histogram, said threshold is outside said range between the highest and the lowest grey levels and the value of said threshold is determined by comparing said representation of said grey levels with a preset means background value,

(d) allocating to said pixel a value corresponding to black or to white of said image as transformed, depending on whether said pixel has a grey level exceeding or below said selected threshold, and

(e) repeating steps (a) to (d) for each pixel of said initial image.

4,977,606

RADIAL PISTON PUMP

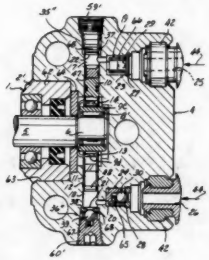
Ludwig Budecker, Frankfurt am Main, Fed. Rep. of Germany, assignor to Alfred Teves GmbH, Frankfurt am Main, Fed. Rep. of Germany

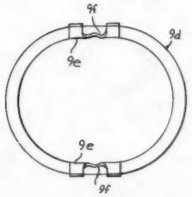
Continuation-in-part of Ser. No. 146,055, Jun. 20, 1988, Pat. No. 4,171,538. This application Apr. 26, 1989, Ser. No. 344,562

Claims priority, application Fed. Rep. of Germany, Jan. 23, 1987, 3701857

Int. Cl.[5] F04B *21/02*

U.S. Cl. 417—538 **3 Claims**





1. In a radial piston pump wherein a pair of cylindrical pistons are mounted within a housing at diametrically opposite sides of a central axis for reciprocating movement radially of said axis, said pump including a drive shaft rotatable about said axis and an eccentric bearing on said drive shaft engaged between the opposed radially inner ends of said pistons to drive said pistons in reciprocation upon rotation of said shaft;

the improvement comprising means defining a circumferentially extending groove in each of said pistons adjacent its radially inner end, each groove having facing opposed walls spaced from each other axially of the piston, connecting ring means interconnecting said pistons to each other to maintain a substantially fixed spacing between said radially inner ends of said pistons maintaining said inner ends engaged with said eccentric bearing during radial reciprocation, said ring means comprising a rigid annular ring disposed in generally coaxial axially overlapping relationship to said eccentric bearing and having a central opening therethrough loosely receiving said eccentric bearing, a pair of bifurcated arm means integral with and projecting generally axially from one side of said ring at diametrically opposed positions on said ring into said grooves in said pistons, each of said arm means respectively being engaged by and between said opposed walls of the grooves of said pistons with the pistons re-

ceived within the bifurcation of the arm means to clampingly couple said pistons to said ring.

4,977,607

METHOD OF GENERATING AN RF SIGNAL MODULATED BY A MESSAGE SIGNAL AND DISTORTED BY A PREDETERMINED FADING PROFILE FOR TESTING RF RECEIVERS, AND APPARATUS FOR CARRYING OUT THE METHOD INCLUDING A FADING SIMULATOR

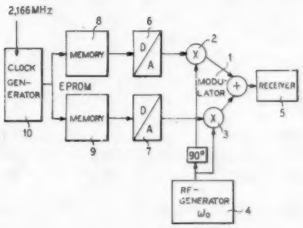
Thomas Maucksch, Ostermünchen; Gottfried Holzmann, Ebersberg, and Frank Körber, Gröbenzell, all of Fed. Rep. of Germany, assignors to Rohde & Schwarz GmbH & Co., Fed. Rep. of Germany

Filed Nov. 30, 1989, Ser. No. 443,486

Claims priority, application Fed. Rep. of Germany, Dec. 1, 1988, 3840498

Int. Cl.[5] H04B *15/00*

U.S. Cl. 455—10 **3 Claims**



1. In a method of generating an RF signal modulated by a message signal and distorted by a predetermined fading profile for testing RF receivers, the improvement comprising the steps of:

arithmetically processing a sequence of digital phase and amplitude values corresponding to a message signal by a predetermined fading profile;

storing the processed sequence; and

amplitude and phase modulating and RF carrier with the stored sequence of fading profile-processed phase and amplitude values.

4,977,608

RADIO COMMUNICATION SYSTEM

Kiroyuki Hashimoto; Nobuo Iizuka, and Suzuki Akira, all of Tokyo, Japan, assignors to Kabushiki Kaisha Kenwood, Tokyo, Japan

Continuation of Ser. No. 299,026, Jan. 19, 1989, abandoned, which is a division of Ser. No. 113,355, Oct. 28, 1987, Pat. No. 4,850,030, which is a continuation of Ser. No. 830,583, Feb. 7, 1986, abandoned. This application Jan. 2, 1990, Ser. No. 462,336

Claims priority, application Japan, Jun. 23, 1984, 59-128451

Int. Cl.[5] H04B *1/50*

U.S. Cl. 425—62 **2 Claims**

1. A transceiver comprising:

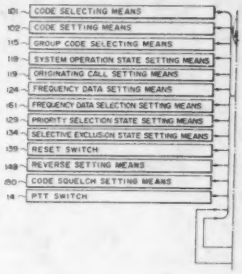
a register for storing a code of representing a frequency,

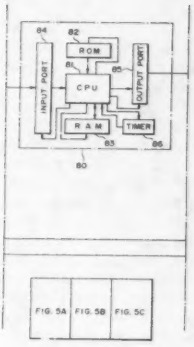
a transmitter for transmitting a signal at a channel frequency determined by the code set in said register;

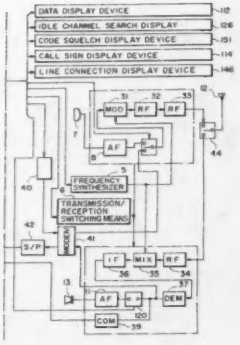
means in response to a manual operation for generating an instruction signal indicative of a changeover of transmission channel frequency; and

control means responsive to a calling instruction for setting a code of representing a start channel frequency in said register so that said transmitter transmits a signal including a shift channel frequency information at the start channel frequency and thereafter for shifting and transmitted into the shift channel frequency to be in a transmission/reception state;

wherein said control means responsive to the transmission channel frequency changeover instruction changes over the contents of said register from the code of representing


101 CODE SELECTING MEANS
102 CODE SETTING MEANS
115 GROUP CODE SELECTING MEANS
118 SYSTEM OPERATION STATE SETTING MEANS
119 ORIGINATING CALL SETTING MEANS
124 FREQUENCY DATA SETTING MEANS
161 FREQUENCY DATA SELECTION SETTING MEANS
129 PRIORITY SELECTION STATE SETTING MEANS
134 SELECTIVE EXCLUSION STATE SETTING MEANS
139 RESET SWITCH
149 REVERSE SETTING MEANS
150 CODE SQUELCH SETTING MEANS
14 PTT SWITCH



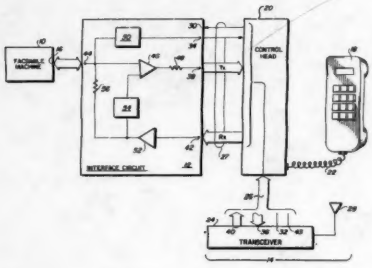


the start channel frequency to the code of representing the shift channel frequency or from the code of representing the shift channel frequency to the code of representing the start channel frequency.

4,977,609
INTERFACE CIRCUIT FOR TELECOMMUNICATIONS DEVICES

Dana W. McClure, El Toro, Calif., assignor to GTE Cellular Communications Corporation, Houston, Tex.

Filed Oct. 28, 1988, Ser. No. 263,938
Int. Cl.[5] H04B 1/38; H04N 1/00
U.S. Cl. 455—89 29 Claims



27. An interface circuit for interconnecting a two wire bi-directional port with both an audio transmit port and an audio receive port, comprising:

receive amplifier means having an input coupled to the audio receive port and an output coupled to the bi-directional port for producing receive signals that contribute components of a signal present at the bi-directional port,

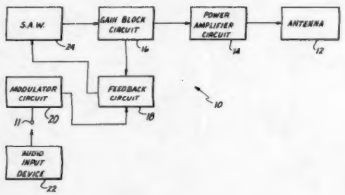
transmit amplifier means having an input connected to the bi-directional port and an output coupled to the audio transmit port for producing a transmit signal, and

altering means connected between the output of the receive amplifier and another input of the transmit amplifier for applying modified receive signals to the transmit amplifier whereby the receive signal components present upon different inputs to the transmit amplifier are reduced in the transmit signal produced by the transmit amplifier means.

4,977,610
WIRELESS COMMUNICATION APPARATUS AND METHOD OF OPERATING SAME

Donald A. Kutz, Del Mar, and Kenneth R. Fasen, San Diego, both of Calif., assignors to H.M. Electronics, Inc., San Diego, Calif.

Continuation of Ser. No. 176,939, Apr. 4, 1988, abandoned. This application Oct. 23, 1989, Ser. No. 425,418
Int. Cl.[5] H04A 11/12
U.S. Cl. 455—120 12 Claims



1. A transmitter for sending an audio signal comprising:

means for receiving an analog audio signal;

circuit means for controlling the amplitude of a carrier frequency signal;

filter means for passing a predetermined frequency signal only, wherein said filter means includes a surface acoustic wave device, and wherein said predetermined frequency signal is a modulated carrier frequency signal;

means for connecting directly said filter means and said circuit means to facilitate oscillation between said filter means and said circuit means;

feedback means coupled to said filter means and to said circuit means for causing oscillation at a predetermined frequency, said predetermined frequency being a single carrier frequency;

means for modulating said analog audio signal on said carrier frequency signal;

means for coupling directly said means for receiving the audio signal, and said means for modulating to said surface acoustic wave device, for facilitating modulating said analog audio signal on said carrier frequency signal;

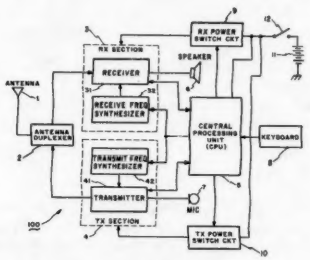
said filter means, said feedback means and said circuit means defining oscillating means for generating a single carrier frequency signal; and

means responsive to said oscillating means for broadcasting the modulated carrier frequency signal.

4,977,611
PORTABLE RADIO APPARATUS HAVING BATTERY SAVED CHANNEL SCANNING FUNCTION

Tsuguo Maru, Tokyo, Japan, assignor to NEC Corporation, Japan

Filed Feb. 19, 1988, Ser. No. 158,210
Claims priority, application Japan, Feb. 20, 1987, 62-37008
Int. Cl.[5] H04B 1/04, 1/16
U.S. Cl. 455—161 16 Claims



11. A method of scanning channels of a portable radio apparatus, comprising the steps of:

tuning a receiving section to a plurality of channels to detect the electric field strength of the respective channels;

selecting at least one channel among said plurality of channels having the strongest electric field strength;

deciding whether or not data is present on said at least one channel;

when data is not present on said at least one channel, cyclically and continuously tuning said receiving section to the respective channels;

when said cyclic and continuous tuning operation has continued for more than a predetermined period of time while data is not present on any of said channels, intermittently tuning said receiving section to said respective channels; and

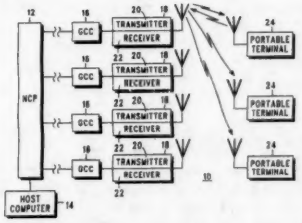
feeding power to said receiving section continuously during said continuous tuning operation and intermittently during said intermittent tuning operation.

4,977,612

CHANNEL SELECTION IN A MULTI-FREQUENCY RADIO DATA COMMUNICATION SYSTEM

Timothy J. Wilson, Schaumburg, Ill., assignor to Motorola, Inc., Schaumburg, Ill.

Filed Oct. 10, 1989, Ser. No. 419,369
Int. Cl.[5] H04Q 7/00; H04B 17/00
U.S. Cl. 455—166 20 Claims



1. In a multi-frequency radio data communication system operating on inbound and outbound channels with multiple transmitting sites interconnected to a central network control processor NCP and having multiple portable terminals, a method of channel selection for portable terminal usage which assures a set level of signal/service quality without unduly affecting outbound capacity, including the steps of:

a. having each portable terminal randomizing the list of frequencies available in the system;

b. each terminal upon initial operation selecting a channel from said random list, and if traffic is found, evaluating the quality level thereof and if acceptable attempting to register thereon by sending a channel registration message and receiving back an acknowledgement, if successful;

c. each portable terminal continuing to monitor the outbound channel and when signal/service quality falls below a threshold level, selecting a new channel from its random list and attempting to register thereon in the manner set forth in step (b); and

d. said portable terminals in response to a failure to successfully send an inbound message due to message errors, as well as receiving no acknowledgement response to a transmitter channel registration message, treating the same as an indication of poor signal/service quality and repeating step (c).

4,977,613

FINE TUNING FREQUENCY SYNTHESIZER WITH FEEDBACK LOOP FOR FREQUENCY CONTROL SYSTEMS

Don R. Holcomb, Sr., Scottsdale; Mark J. Brown, Phoenix, and Lawrence R. Schumacher, Mesa, all of Ariz., assignors to Motorola, Inc., Schaumburg, Ill.

Filed Oct. 17, 1988, Ser. No. 258,747
Int. Cl.[5] H04B 1/26
U.S. Cl. 455—182 13 Claims

1. A frequency converter having an input signal supply for providing input signals coupled to one input of a converter mixer and a phase locked loop coupled to another input of the converter mixer, the phase locked loop being turnable within a continuous frequency band to any one of a plurality of operator selected frequencies to enable the converter mixer to convert the converter signal to an output signal at a selected fixed frequency, the phase locked loop including in combination:

reference frequency oscillator;

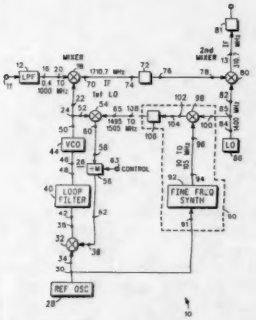
a voltage controlled oscillator having a control terminal;

a detector with a first input, a second input and an output, said first input of said detector being coupled to said reference frequency oscillator, said output of said detector being coupled to said control terminal of said voltage controlled oscillator;

a feedback control loop coupling a portion of the output of said voltage controlled oscillator to said second input of said detector;

further mixer means included in said feedback control loop; and

fine tuning frequency synthesizer means having an output coupled to said mixer means, said fine tuning frequency synthesizer means being adjustable by the operator to provide a fine tuning control signal to said mixer means to



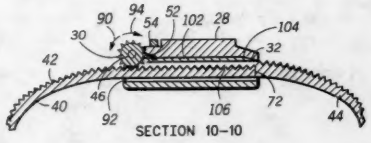
tune the frequency of the phase locked loop, said fine tuning control signal having a selected one of a plurality of predetermined frequencies which are changeable by the operator, said mixer means being responsive to the frequency of said fine tuning control signal to change the output frequency of the phase locked loop in response to adjustment of the frequency of said fine tuning control signal to tune the phase locked loop to any one of the plurality of operator selected frequencies to enable the converter mixer to provide the output signal at the desired fixed frequency.

4,977,614

WRISTBAND WITH LOOP ANTENNA

Robert Kurcbart, Boca Raton, Fla., assignor to Motorola, Inc., Schaumburg, Ill.

Filed Oct. 23, 1989, Ser. No. 425,095
Int. Cl.[5] H04B 1/18
U.S. Cl. 455—193 10 Claims



1. An apparatus comprising:

a radio receiver disposed in a housing having a band suitable for attaching to an object;

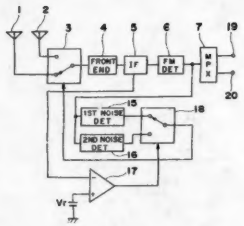
an antenna having a substantially constant resonant frequency said antenna comprising a gear rack positioned contiguous to said band; and

adjusting means for adjusting the length of said antenna, said adjusting means being positioned contiguous to said apparatus and to said antenna and comprising a spur gear wheel mechanism for engaging said antenna.

4,977,615
DIVERSITY RECEIVER

Hirohisa Suzuki, Gunma; Akira Kabashima, Ota; Mikio Yamagishi, Gunma, and Ryuichi Ogawa, Gunma, all of Japan, assignors to Sanyo Electric Co., Ltd., Osaka, Japan

Filed May 16, 1989, Ser. No. 352,775
Claims priority, application Japan, May 19, 1988, 63-122317
Int. Cl.[5] H04B *7/08, 1/10*
U.S. Cl. 455—277 **9 Claims**

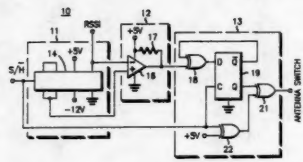


1. A diversity receiver comprising:
first and second antennas for receiving an RF signal;
receiver means,
an antenna switching circuit for selecting one of said first and second antennas for coupling to said receiver means,
a first detection circuit, having a high sensitivity, for detecting a noise signal contained within the received RF signal;
a second detection circuit, having a low sensitivity, for detecting a noise signal contained within the received RF signal;
a field strength detection circuit for detecting the field strength of the received RF signal; and
a selection circuit for selecting an output signal generated by either one of the first and second detection circuits according to the output signal of said field strength detection circuit, and for providing a switching signal to said antenna switching circuit for switching the selection of said antenna;
whereby when the field strength of the received signal is relatively strong, said first detection circuit with high sensitivity is used for the noise detection, and when the field strength is relatively weak, said second detection circuit with low sensitivity is used for the noise detection.

4,977,616
ANTENNA SELECTION CONTROL CIRCUIT

Donald L. Linder; Steve H. Goode, both of Palatine; Henry L. Kazecki, Des Plaines; Donald W. Dennis, Schaumburg, and James C. Baker, Hanover Park, all of Ill., assignors to Motorola, Inc., Schaumburg, Ill.

Continuation of Ser. No. 126,548, Nov. 30, 1987, abandoned. This application Oct. 26, 1989, Ser. No. 428,429
Int. Cl.[5] H04B *7/08, 7/212*
U.S. Cl. 455—277 **14 Claims**

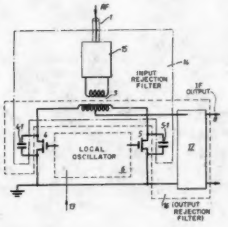


1. An antenna selection control circuit for use with a TDM RF receiver having at least two antennas for receiving an information signal, which information signal is comprised of time slots of interest that contain information of interest to the receiver and other time slots that contain information not of interest to the receiver, comprising:
(A) first means for developing signals related to received signal quality for at least two of said antennas, wherein said signal is developed for at least one of said antennas during a time slot that contains information not of interest to the receiver;
(B) second means responsive to said first means for comparing said developed signals to identify which of said at least two antennas received a signal of higher quality;
(C) third means responsive to said second means for causing said receiver to use said identified antenna during a subsequent time slot that contains information of interest to the receiver.

4,977,617
MIXER

Rakesh Sharma, Chelmsford, and Boleslaw M. Sosin, Boreham, both of United Kingdom, assignors to The Marconi Company Limited, Stanmore, United Kingdom

Continuation of Ser. No. 244,129, Sep. 14, 1988, abandoned. This application Dec. 12, 1989, Ser. No. 453,130
Claims priority, application United Kingdom, Sep. 18, 1987, 8721978
Int. Cl.[5] H04B *1/28, 110*
U.S. Cl. 455—319 **11 Claims**



1. A mixer, comprising:
a local oscillator;
a first switching element;
a signal input;
a signal output;
an input rejection filter; and
an output rejection filter;
wherein said local oscillator is electrically connected directly to a control electrode of said first switching element such that said local oscillator incorporates an inherent capacity between said control electrode and a switched electrode of said first switching element; and
wherein said input rejection filter has a high reflection coefficient of substantially the opposite phase angle to said output rejection filter, as seen from said first switching element, at frequencies other than the desired input and output frequencies.

4,977,618
INFRARED DATA COMMUNICATIONS

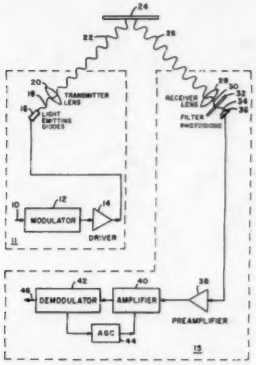
Richard C. Allen, Los Gatos, Calif., assignor to Photonics Corporation, Campbell, Calif.

Filed Apr. 21, 1988, Ser. No. 184,261
Int. Cl.[5] H04J *14/00;* **H04B** *10/24, 10/14*
U.S. Cl. 455—607 **23 Claims**

1. An apparatus for transmitting information between components in a communication network within an enclosure having preexisting infrared reflecting characteristics comprising:
a. a plurality of transceivers, each having transmitter means

for transmitting information modulated into infrared radiation, receiver means for receiving the infrared radiation, and focusing means for focusing the transmitter means and receiver means onto a target area; and

b. means for positioning the plurality of transceiver means at different locations in said enclosure with the focusing



means of the plurality of the transceiver means focused onto the same target area which comprises a small spot of an inner surface of the enclosure which is not modified to alter its infrared reflective characteristics so that more than one network can operate within the enclosure and noise sources within the enclosure can be omitted from the target area.

4,977,619

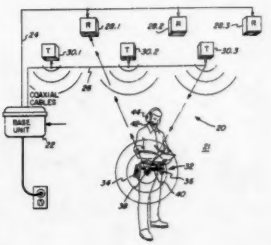
DISTRIBUTED INFRARED COMMUNICATION SYSTEM

James W. Crimmins, 15 Nutmeg La., Wilton, Conn. 06897

Continuation of Ser. No. 913,993, Oct. 1, 1986, abandoned. This application Jul. 1, 1988, Ser. No. 214,181

Int. Cl.[5] H04J *10/14, 14/02*

U.S. Cl. 455—607 **15 Claims**



1. A two-way communications system for a generally enclosed space employing a base infrared transmitter and a base unit infrared receiver that communicate through a variable or undefined length optical path at carrier frequencies respectively with an up-link infrared receiver and from an up-link infrared transmitter, and a base unit for generating transmission signals for the base transmitter and for receiving signals from the base receiver, comprising:

said base infrared transmitter including a plurality of base unit infrared transmitter modules placed at distributed locations within the space to generate infrared light signals, first cable means for coupling the transmission signals from the base unit to the base unit transmitter modules so as to cause the transmission of infrared light therefrom towards the up-link infrared receiver;

said based infrared receiver including a plurality of base unit infrared receiver modules placed at distributed locations within the space to detect light from the up-link infrared transmitter and produce at carrier frequencies output signals representative thereof, and second cable means for coupling the output signals from base unit infrared receivers to the base unit, means for combining said output signals from base infrared receiver modules and generating a level signal representative of the combined infrared energy detected at base unit receiver modules.

means responsive to the level signal for varying the base transmission signals so as to establish, from the up-link infrared transmitter, an optical output level that is at a level needed for detection by at least one of said distributed base unit infrared receiver modules; wherein a plurality of base unit infrared transmitter and receiver modules and a plurality of up-link infrared transmitters and receivers operate at different carrier frequencies for operation in different frequency channels;

with base-unit infrared receiver modules operative in different frequency channels being placed in proximity to each other so as to effectively have a common optical field of view.

4,977,620

OPTICAL HOMODYNE DETECTION

David W. Smith; David Cotter, both of Woodbridge, and Richard Wyatt, Martlesham Heath, all of England, assignors to British Telecommunications plc, Great Britain

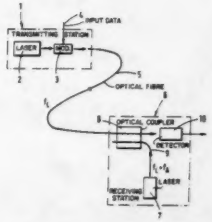
PCT No. PCT/GB86/00252, § 371 Date Jan. 5, 1987, § 102(e) Date Jan. 5, 1987, PCT Pub. No. WO86/06849, PCT Pub. Date Nov. 20, 1986

PCT Filed May 9, 1986, Ser. No. 2,663

Claims priority, application United Kingdom, May 9, 1985, 8511689; Oct. 7, 1985, 8524688

Int. Cl.[5] H04B *10/06*

U.S. Cl. 455—619 **12 Claims**



1. An optical homodyne detection system comprising:

a source of optical radiation;

means for injecting radiation from the source in one direction into an optical waveguide in which, in use, a modulated optical wave having carrier and information components travels in the opposite direction, the characteristics of the radiation from the source and the form of the waveguide being such that stimulated Brillouin scattering occurs and produces a scattered optical wave whereby the carrier component of the modulated optical wave is amplified, the information component being substantially unamplified; and

demodulating means to which the optical wave with the amplified carrier component is fed.

DESIGN PATENTS

GRANTED DEC. 11, 1990

ERRATA

For CLASS	See PATENT NO.
D09-338	312,768
D21-065	312,784
D28-046	312,861

DESIGNS

DECEMBER 11, 1990

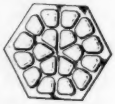
312,719
COMBINED HOT DOG AND PRETZEL
Robert M. Kempher, Dayton, Ohio, assignor to Sara Lee Corporation, Chicago, Ill.
Filed Jul. 24, 1985, Ser. No. 758,482
Term of patent 14 years
U.S. Cl. D1—101

312,720
CANNOLI
Anna F. Greene, 49 Old Stage Rd., P.O. Box 346, Montague, Mass. 01351
Filed Oct. 19, 1987, Ser. No. 110,478
Term of patent 14 years
U.S. Cl. D1—122

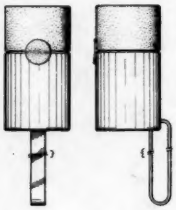
312,721
TUNIC
Roger D. Shea, P.O. Box 1156, Pierre, S. Dak. 57501
Filed Jul. 3, 1986, Ser. No. 881,980
Term of patent 14 years
U.S. Cl. D2—212

312,722
SHOE UPPER
David E. Miller, Carver, and Paul D. Brown, Hingham, both of Mass., assignors to Reebok International Ltd., Stoughton, Mass.
Filed Jun. 23, 1989, Ser. No. 370,015
Term of patent 14 years
U.S. Cl. D2—314

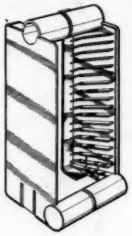
312,723
CUSHIONING PIECE FOR SHOE SOLE
Yoshihiro Okada, Kobe, Japan, assignor to Asics Corporation, Kobe, Japan
Filed Apr. 14, 1988, Ser. No. 182,066
Claims priority, application Japan, Oct. 14, 1987, 62-41912
Term of patent 14 years
U.S. Cl. D2—318



312,724
UMBRELLA HANDLE
Ann S. Cain, Cincinnati, Ohio, assignor to 'Totes', Incorporated, Loveland, Ohio
Filed Mar. 15, 1990, Ser. No. 493,866
Term of patent 14 years
U.S. Cl. D3—12

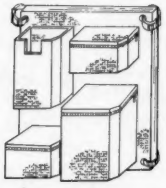


312,725
COMPACT DISC HOLDER
Otto Schubert, 6515 Boulevard East, West New York, N.Y. 07093
Filed Aug. 15, 1986, Ser. No. 896,706
Claims priority, application Canada, Jun. 9, 1986, 09-06-86-1
Term of patent 14 years
U.S. Cl. D3—35



312,726
SKI BOOT BAG OR THE LIKE
Liz Kline, P.O. Box 41, Trenton, Utah 84338
Filed Feb. 24, 1987, Ser. No. 18,067
Term of patent 14 years
U.S. Cl. D3—36

312,727
POCKETED PANEL FOR ATTACHMENT TO A CHAIR BACK
Nicholas P. Kunewalder, 409 4th St. #5, Encinitas, Calif. 92024
Filed Dec. 28, 1987, Ser. No. 138,023
Term of patent 14 years
U.S. Cl. D3—74



312,728

LUGGAGE CASE

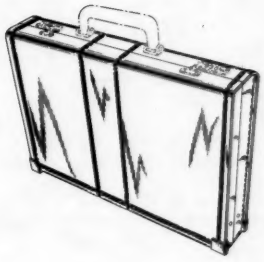
Walter Bialo, Scarsdale, N.Y., assignor to Ventura Travelware, Inc., Long Island City, N.Y.

Filed Oct. 20, 1986, Ser. No. 920,873

The portion of the term of this patent subsequent to Sep. 1, 2001, has been disclaimed.

Term of patent 14 years

U.S. Cl. D3—76



312,729

TOOTHBRUSH BACK AND HANDLE UNIT

Somboon Auttajark, Bangkok, Thailand, assignor to Eagle Hygienic Rubber Co., Ridgewood, N.Y.

Filed Feb. 22, 1988, Ser. No. 159,034

Term of patent 14 years

U.S. Cl. D4—104

312,730

WASHING BRUSH FOR MOTOR VEHICLES

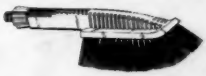
Gianfranco Roman, Pasiano, Italy, assignor to Claber S.p.A., Italy

Filed Mar. 2, 1988, Ser. No. 163,289

Claims priority, application Italy, Sep. 15, 1987, 22327/87[U]

Term of patent 14 years

U.S. Cl. D4—115



312,731

SCARF OR SIMILAR ARTICLE

Gerolamo Etro, Milan, Italy, assignor to ERTO S.p.A., Milan, Italy

Filed May 19, 1987, Ser. No. 51,311

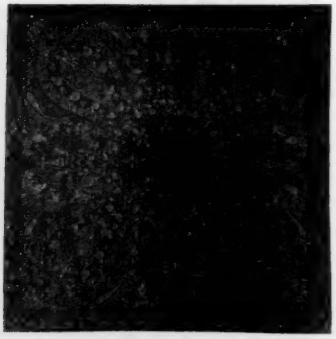
Claims priority, application Italy, Nov. 21, 1986, 23764/86[U]

Term of patent 14 years

U.S. Cl. D5—45

312,732
SCARF OR SIMILAR ARTICLE
Gerolamo Etro, Milan, Italy, assignor to ETRO S.P.A., Milan, Italy
Filed May 19, 1987, Ser. No. 51,312
Claims priority, application Italy, Nov. 21, 1986, 23763/86[U]
Term of patent 14 years
U.S. Cl. D5—45

312,733
SHAWL
Gerolamo Etro, Milan, Italy, assignor to Etro S.P.A., Milan, Italy
Filed Jun. 10, 1987, Ser. No. 61,825
Claims priority, application Italy, Dec. 19, 1986, 24151/86[U]
Term of patent 14 years
U.S. Cl. D5—45

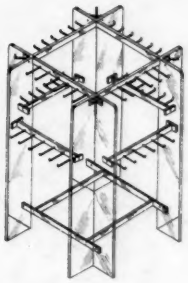


312,734
COMBINED TABLE AND SEATING UNIT
Alan H. Friedman, Millburn, N.J., assignor to Kanowsky Furniture, Inc., Sacramento, Calif.
Filed May 18, 1987, Ser. No. 51,070
Term of patent 14 years
U.S. Cl. D6—335

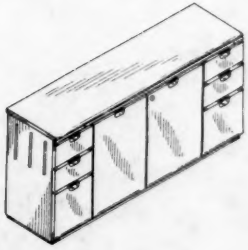
312,735
CONVERTIBLE CHAIR
Jochen Hoffmann, Bielefeld, Fed. Rep. of Germany, assignor to Bonaldo, S.p.A., Italy
Filed Mar. 16, 1987, Ser. No. 26,526
Claims priority, application Italy, Sep. 16, 1986, 23048/86[U]
Term of patent 14 years
U.S. Cl. D6—335

312,736
STOOL
Raymond Grosfillex, Arbent 01107, Oyonnax, France
Filed Jun. 22, 1987, Ser. No. 64,456
Claims priority, application World Int. Prop. O., Dec. 22, 1986, DM/007953
Term of patent 14 years
U.S. Cl. D6—349

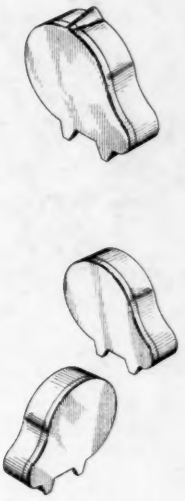
312,737
GARMENT RACK OR SIMILAR ARTICLE
Marvin Glassenberg, 6857 N. Francisco, Chicago, Ill. 60645
Filed Dec. 11, 1987, Ser. No. 132,044
Term of patent 14 years
U.S. Cl. D6—415



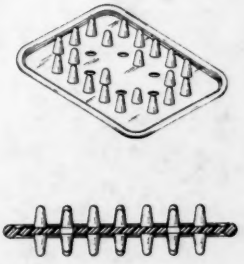
312,738
CREDENZA
Thomas J. Newhouse, Grand Rapids, Mich., assignor to Herman Miller, Inc., Zeeland, Mich.
Filed Jun. 2, 1987, Ser. No. 57,826
Term of patent 14 years
U.S. Cl. D6—446



312,739
JUMBO TOILET TISSUE DISPENSER
Jerry A. Sigmund, Bala Cynwyd, Pa., assignor to Scott Paper Company, Philadelphia, Pa.
Filed Aug. 30, 1989, Ser. No. 400,893
Term of patent 14 years
U.S. Cl. D6—523

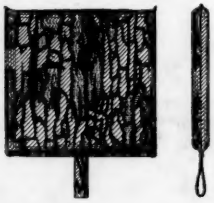


312,740
SOAP BAR HOLDER
Steven E. Greenhut, 21646 Club Villa Ter., Boca Raton, Fla. 33433, and Sheldon H. Goodman, 4079 Princeton Blvd., South Euclid, Ohio 44121
Filed Nov. 21, 1988, Ser. No. 273,497
Term of patent 14 years
U.S. Cl. D6—536

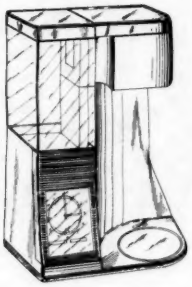


312,741
SEAT CUSHION
May E. Treadwell, 7 Laurel St., Binghamton, N.Y. 13790
Filed Jul. 8, 1988, Ser. No. 222,005
Term of patent 14 years
U.S. Cl. D6—601

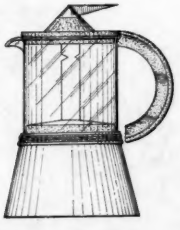
312,742
SEAT CUSHION
Raymond Paulhus, 21A Changon La., Hudson, N.H. 03051
Filed Nov. 8, 1988, Ser. No. 268,997
Term of patent 14 years
U.S. Cl. D6—601



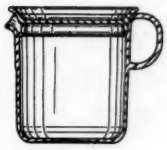
312,743
COFFEE MAKER
Robert Osit, Shelton, Conn., assignor to Black & Decker, Inc., Newark, Del.
Filed Jun. 27, 1988, Ser. No. 211,671
Term of patent 14 years
U.S. Cl. D7—309



312,744
ESPRESSO COFFEE MAKER
Carsten Jorgensen, Dattenbergrain 31, CH-6010 Kriens, Switzerland
Filed Apr. 20, 1987, Ser. No. 39,911
Claims priority, application Denmark, Oct. 29, 1986, 1093/86
Term of patent 14 years
U.S. Cl. D7—317



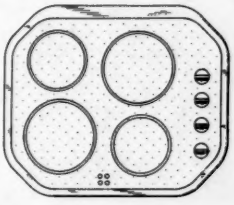
312,745
COVERED PITCHER OR THE LIKE
Robert H. C. M. Daenen, Erembodegem, and Pieter J. K. De-Coster, Aalst, both of Belgium, assignors to Dart Industries Inc., Deerfield, Ill.
Filed Feb. 2, 1988, Ser. No. 152,599
Term of patent 14 years
U.S. Cl. D7—317



312,746
BARBECUE GRILL
Jon G. Lutter, 15065 Bowden Ave., Morgan Hill, Calif. 95037
Filed Jun. 20, 1988, Ser. No. 209,031
Term of patent 14 years
U.S. Cl. D7—337

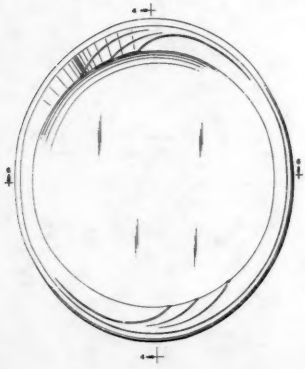
312,747
COFFEE POT WARMER
Wong F. Keung, Kowloon, Hong Kong, assignor to Motor Electric Manufacturing Co. Ltd., Hong Kong
Filed Apr. 20, 1987, Ser. No. 39,903
Claims priority, application United Kingdom, Dec. 17, 1986, 1038833
Term of patent 14 years
U.S. Cl. D7—367

312,748
COOKTOP
Karl-Heinz Jung, Münsingen-Dottingen, and Manfred Mück, Kürnbach, both of Fed. Rep. of Germany, assignors to Blanco GmbH & Co. KG, Obererdingen, Fed. Rep. of Germany
Filed Mar. 17, 1988, Ser. No. 169,351
Claims priority, application Fed. Rep. of Germany, Sep. 23, 1987, 10 AR 159/87
Term of patent 14 years
U.S. Cl. D7—367

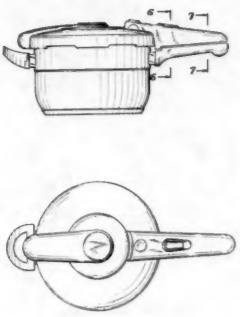


312,749
HANDLE FOR A KITCHEN UTENSIL
William I. Kessler, Sheboygan, Wis., assignor to The Vollrath Company, Inc, Sheboygan, Wis.
Filed May 14, 1987, Ser. No. 50,213
Term of patent 14 years
U.S. Cl. D7—395

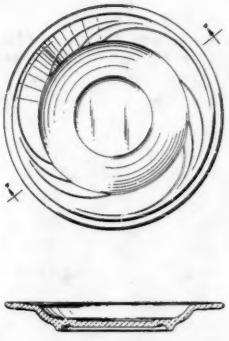
312,750
SERVING PLATE OR SIMILAR ARTICLE
Steve A. Unger, Manilus, N.Y., assignor to Syracuse China Corporation, Syracuse, N.Y.
Filed Mar. 3, 1988, Ser. No. 163,411
Term of patent 14 years
U.S. Cl. D7—545



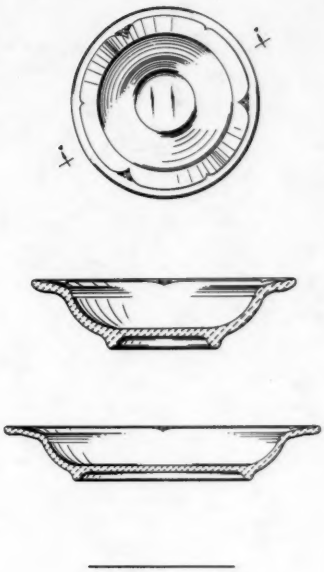
312,751
PRESSURE COOKER
Mariano G. Moreno, Barcelona, Spain, assignor to Bra, S.A., Spain
Filed Apr. 6, 1987, Ser. No. 35,170
Term of patent 14 years
U.S. Cl. D7—358



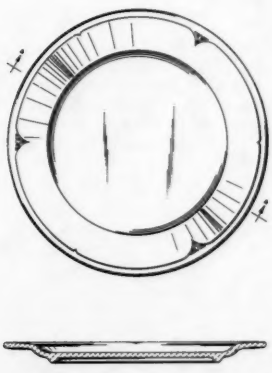
312,752
SAUCER OR SIMILAR ARTICLE
Steve A. Unger, Manilus, N.Y., assignor to Syracuse China Corporation, Syracuse, N.Y.
Filed Mar. 3, 1988, Ser. No. 163,408
Term of patent 14 years
U.S. Cl. D7—585



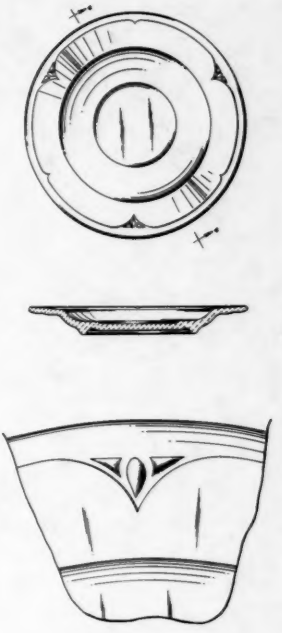
312,753
BOWL OR SIMILAR ARTICLE
Steve A. Unger, Manilus, N.Y., assignor to Syracuse China Corporation, Syracuse, N.Y.
Filed Mar. 3, 1988, Ser. No. 163,413
Term of patent 14 years
U.S. Cl. D7—585



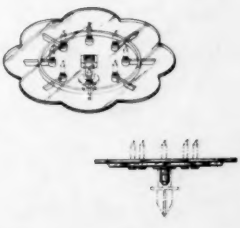
312,754
PLATE OR SIMILAR ARTICLE
Steve A. Unger, Manilus, N.Y., assignor to Syracuse China Corporation, Syracuse, N.Y.
Filed Mar. 3, 1988, Ser. No. 163,933
Term of patent 14 years
U.S. Cl. D7—585



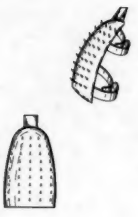
312,755
SAUCER OR SIMILAR ARTICLE
Steve A. Unger, Manilus, N.Y., assignor to Syracuse China Corporation, Syracuse, N.Y.
Filed Mar. 3, 1988, Ser. No. 163,934
Term of patent 14 years
U.S. Cl. D7—585



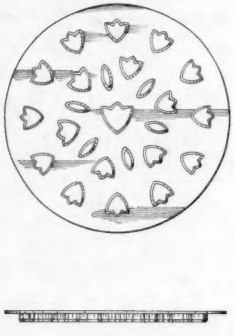
312,756
CAKE SHIELD
Louis Crisci, 406 N. Putnam Ave., Lindenhurst, N.Y. 11757
Filed Mar. 9, 1988, Ser. No. 165,552
Term of patent 14 years
U.S. Cl. D7—610



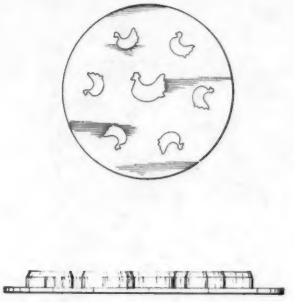
312,757
FINGER-GRIPPING TOOL FOR USE IN EATING FOOD
Mouricio Zwang, 15446 Shefman Way #3-205, Van Nuys, Calif. 91406
Filed Jan. 11, 1988, Ser. No. 142,396
Term of patent 14 years
U.S. Cl. D7—683



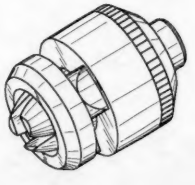
312,758
PIE TOPPER PLATE
Joan P. Wolff, Harrison, N.Y., assignor to Coats & Clark, Inc., Yorktown Heights, N.Y.
Filed Apr. 15, 1988, Ser. No. 182,040
Term of patent 14 years
U.S. Cl. D7—675



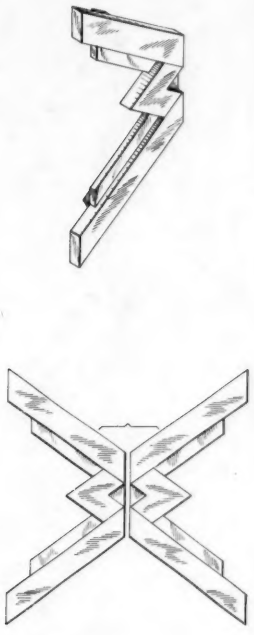
312,759
PIE TOPPER PLATE
Joan P. Wolff, Harrison, N.Y., assignor to Coats & Clark, Inc., Yorktown Heights, N.Y.
Filed Apr. 15, 1988, Ser. No. 182,043
Term of patent 14 years
U.S. Cl. D7—675



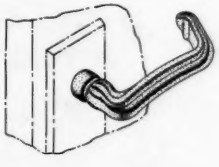
312,760
ADJUSTABLE SOCKET
David S. Colvin, 23933 Haynes, Farmington Hills, Mich. 48018
Filed Aug. 11, 1986, Ser. No. 895,345
Term of patent 14 years
U.S. Cl. D8—29



312,761
DOOR HARDWARE
Michael J. Tremonti, Hawthorne, N.J., assignor to 501 Hardware Design Inc., Fairfield, N.J.
Filed Nov. 21, 1988, Ser. No. 275,024
Term of patent 14 years
U.S. Cl. D8—305



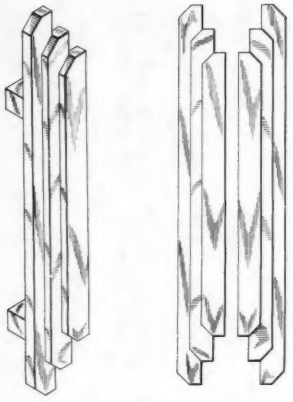
312,762
HANDLE FOR A DOOR OR THE LIKE
Richard Adams, Temple, and Peter Fayerman, Gladwyne, both of Pa., assignors to Baldwin Hardware Corporation, Reading, Pa.
Filed Aug. 26, 1988, Ser. No. 237,942
Term of patent 14 years
U.S. Cl. D8—308



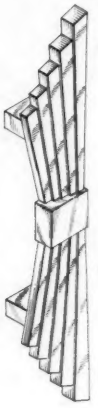
312,763
DOOR PULL
Michael J. Tremonti, Hawthorne, N.J., assignor to 501 Hardware Design Inc., Fairfield, N.J.
Filed Nov. 21, 1988, Ser. No. 275,027
Term of patent 14 years
U.S. Cl. D8—316

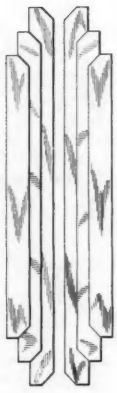
312,764
DOOR PULL
Michael J. Tremonti, Hawthorne, N.J., assignor to 501 Hardware Design Inc., Fairfield, N.J.
Filed Nov. 22, 1988, Ser. No. 275,029
Term of patent 14 years
U.S. Cl. D8—317

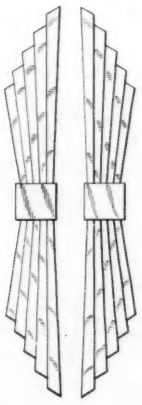
312,765
DOOR HARDWARE
Michael J. Tremonti, Hawthorne, N.J., assignor to 501 Hardware Design Inc., Fairfield, N.J.
Filed Nov. 22, 1988, Ser. No. 274,599
Term of patent 14 years
U.S. Cl. D8—319



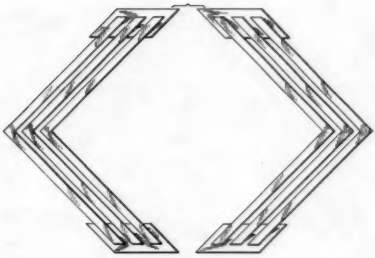
312,766
DOOR HARDWARE
Michael J. Tremonti, Hawthorne, N.J., assignor to 501 Hardware Design Inc., Fairfield, N.J.
Filed Nov. 22, 1988, Ser. No. 274,600
Term of patent 14 years
U.S. Cl. D8—319







312,767
DOOR HARDWARE
Michael J. Tremonti, Hawthorne, N.J., assignor to 501 Hardware Design Inc., Fairfield, N.J.
Filed Nov. 22, 1988, Ser. No. 275,034
Term of patent 14 years
U.S. Cl. D8—319

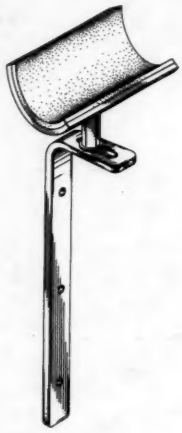


312,768
BOTTLE
Michael Eastman, Jacksonville, Fla., assignor to Roux Laboratories, Inc., Jacksonville, Fla.
Filed Feb. 9, 1987, Ser. No. 12,711
Term of patent 14 years
U.S. Cl. D9—338

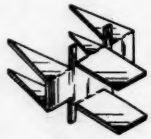
312,769
PUSH-BUTTON KEYLATCH
Robert H. Bisbing, Springfield, Pa., assignor to Southco, Inc., Concordville, Pa.
Filed Jun. 16, 1988, Ser. No. 208,272
Term of patent 14 years
U.S. Cl. D8—338

312,770
COMBINED FLEXIBLE WEB, BUCKLES AND MOUNTING PANEL FOR IMMOBILIZING OBJECTS
William A. Berkan, Jr., P.O. Box 700, Dixon, Calif. 95620
Filed Aug. 12, 1987, Ser. No. 84,709
Term of patent 14 years
U.S. Cl. D8—354

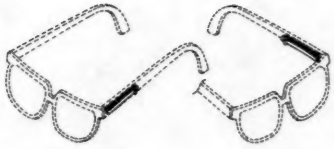
312,771
RECREATIONAL VEHICLE AWNING SUPPORT ADAPTER
Ralph W. Pelletier, HC-01, P.O. Box 312, Hardwood, Mich. 49844
Filed Jan. 9, 1990, Ser. No. 462,426
Term of patent 14 years
U.S. Cl. D8—373



312,772
CEILING TILE SECTION SUPPORT WEDGE
Harold J. Paul, 2015 Magnolia Ave., Pensacola, Fla. 32503
Filed Nov. 5, 1987, Ser. No. 117,134
Term of patent 14 years
U.S. Cl. D8—389



312,773
EYEGLASS CLIP
Juan A. Salinas, 1224 Santa Barbara St., San Diego, Calif. 92107
Filed Jan. 27, 1987, Ser. No. 7,394
Term of patent 14 years
U.S. Cl. D8—395



312,774
COMBINED BOTTLE AND CLOSURE
Ping L. Tacconelli, Los Angeles, Calif., assignor to L'Oreal S.A., France
Filed Sep. 7, 1988, Ser. No. 241,555
Term of patent 14 years
U.S. Cl. D9—352

312,775
COMBINED CONTAINER AND CLOSURE
Ping L. Tacconelli, Los Angeles, Calif., assignor to L'Oreal S.A., France
Filed Sep. 7, 1988, Ser. No. 241,558
Term of patent 14 years
U.S. Cl. D9—352

312,776
COMBINED BOTTLE AND CLOSURE
Ping L. Tacconelli, Los Angeles, Calif., assignor to L'Oreal S.A., France
Filed Sep. 7, 1988, Ser. No. 241,554
Term of patent 14 years
U.S. Cl. D9—371

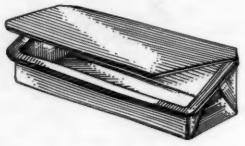
312,777
COMBINED BOTTLE AND CAP
Andre Courreges, Paris, France, assignor to Courreges Design, Paris, France
Filed Dec. 23, 1987, Ser. No. 137,450
Term of patent 14 years
U.S. Cl. D9—375

312,778
COMBINED CONTAINER AND CLOSURE
Ping L. Tacconelli, Los Angeles, Calif., assignor to L'Oreal S.A., France
Filed Sep. 7, 1988, Ser. No. 241,556
Term of patent 14 years
U.S. Cl. D9—396

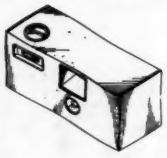
312,779
COMBINED BOTTLE AND CLOSURE
Ping L. Tacconelli, Los Angeles, Calif., assignor to L'Oreal S.A., France
Filed Sep. 7, 1988, Ser. No. 241,557
Term of patent 14 years
U.S. Cl. D9—403

312,780
BOTTLE
Scott W. Demarest, Racine County, Wis., assignor to S. C. Johnson & Son, Inc., Racine, Wis.
Filed Apr. 16, 1987, Ser. No. 39,358
Term of patent 14 years
U.S. Cl. D9—412

312,781
CONTAINER
William R. Rigby, Elkton, Md., assignor to Westvaco Corporation, New York, N.Y.
Filed Jan. 10, 1989, Ser. No. 295,282
Term of patent 14 years
U.S. Cl. D9—420

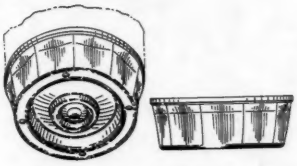


312,782
PACKAGE FOR A DISPOSABLE CAMERA
Takuya Arai, and Kimiaki Nakada, both of Tokyo, Japan, assignors to Fuji Photo Film Co., Ltd., Kanagawa, Japan
Filed Feb. 13, 1987, Ser. No. 15,254
Claims priority, application Japan, Jun. 30, 1986, 61-25409; Aug. 13, 1986, 61-31758
Term of patent 14 years
U.S. Cl. D9—432



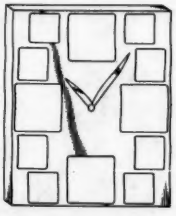
312,783
CORNER STAY FOR A BOX
Herbert G. Sharp, 410 - 30 Rd., Grand Junction, Colo. 81504
Filed Feb. 20, 1987, Ser. No. 17,204
Term of patent 14 years
U.S. Cl. D9—434

312,784
BASE CUP FOR BOTTLES
Donald D. Cochran, Bartlett, and Stephen W. Cornell, Wheaton, both of Ill., assignors to American National Can Company, Chicago, Ill.
Filed May 31, 1988, Ser. No. 200,291
Term of patent 14 years
U.S. Cl. D9—434

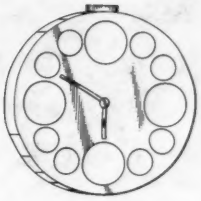


312,785
BEVERAGE CAN COVER
Terence Tucker, 1589 Michael La., Pacific Palisades, Calif. 90272
Filed May 14, 1987, Ser. No. 49,453
Term of patent 14 years
U.S. Cl. D9—447

312,786
COMBINATION PHOTOGRAPHIC FRAME AND CLOCK
Ray C. Ives, Dallas, Tex., assignor to Ives Ideas, Inc., Dallas, Tex.
Filed Nov. 6, 1987, Ser. No. 117,314
Term of patent 14 years
U.S. Cl. D10—2

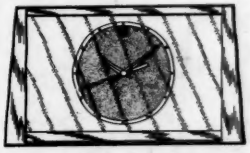


312,787
COMBINATION PHOTOGRAPHIC FRAME AND CLOCK
Ray C. Ives, Dallas, Tex., assignor to Ives Ideas, Inc., Dallas, Tex.
Filed Nov. 6, 1987, Ser. No. 117,315
Term of patent 14 years
U.S. Cl. D10—2



312,788
CLOCK
Kimio Hirota, Tokyo, Japan, assignor to Seikosha Co., Ltd., Japan
Filed Dec. 21, 1987, Ser. No. 136,150
Claims priority, application Japan, Jun. 22, 1987, 62-25325
Term of patent 14 years
U.S. Cl. D10—10

312,789
CLOCK
Asao Takashima, Tokyo, Japan, assignor to Seikosha Co., Ltd., Japan
Filed Sep. 17, 1987, Ser. No. 98,003
Claims priority, application Japan, Mar. 18, 1987, 62-10049
Term of patent 14 years
U.S. Cl. D10—25



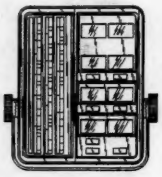
312,790
CLOCK
Kayoko Kato, Tokyo, Japan, assignor to Seikosha Co., Ltd., Japan
Filed Jan. 30, 1987, Ser. No. 9,352
Claims priority, application Japan, Oct. 15, 1986, 61-40799
Term of patent 14 years
U.S. Cl. D10—26

312,791
WRISTWATCH
Emile Benoit-Pequignet, Fournets-Luisans, and Jean-Pierre Viennet, Morteau, both of France, assignors to Montres Emile Péquignet, Morteau, France
Filed Jan. 9, 1987, Ser. No. 1,581
Claims priority, application France, Jul. 23, 1986, 86 4452
Term of patent 14 years
U.S. Cl. D10—32

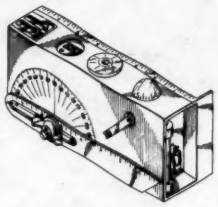
312,792
WRISTWATCH
Michel P. Ratajski, Bienne, Switzerland, assignor to Severin Montres AG, Zug, Switzerland
Filed Jun. 1, 1987, Ser. No. 57,151
Claims priority, application Int'l Pat. Institute, Dec. 8, 1986, DMA/000560
Term of patent 14 years
U.S. Cl. D10—32

312,793
WRIST WATCH
Yoh Fujiwara, Hamura, Japan, assignor to Casio Computer Co., Ltd., Tokyo, Japan
Filed Jul. 29, 1987, Ser. No. 79,281
Term of patent 14 years
U.S. Cl. D10—39

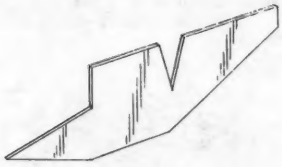
312,794
ELECTRONIC FISHING INFORMATION INSTRUMENT
Robert W. Healey, Tulsa, Okla., assignor to Loren G. Hill, Norman, Okla. and Lakes Illustrated, Inc., Mt. Vernon, Mo.
Filed Feb. 29, 1988, Ser. No. 161,839
Term of patent 14 years
U.S. Cl. D10—53



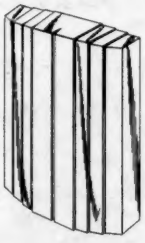
312,795
CARPENTER'S TOOL
Albert F. Fugett, R.R. #2, Box 221, Gaston, Ind. 47342
Filed Aug. 31, 1987, Ser. No. 90,836
Term of patent 14 years
U.S. Cl. D10—62



312,796
ANGLE GAUGE
Kirk P. Parker, 15915 S. San Pedro St., Gardena, Calif. 90240
Filed Apr. 25, 1988, Ser. No. 185,922
Term of patent 14 years
U.S. Cl. D10—64



312,797
DOORBELL OR SIMILAR ARTICLE
James R. Lomas, Stockport, England, assignor to V. & E. Friedland Limited, Cheshire, England
Filed Nov. 10, 1988, Ser. No. 269,652
Claims priority, application United Kingdom, May 10, 1988, 1050638
Term of patent 14 years
U.S. Cl. D10—118



312,798
PENDULUM FOR A CLOCK
Kayoko Kato, Tokyo, Japan, assignor to Seikosha Co., Ltd., Japan
Filed Jan. 25, 1988, Ser. No. 147,767
Claims priority, application Japan, Jul. 24, 1987, 62-29992
Term of patent 14 years
U.S. Cl. D10—130

312,799
PENDULUM FOR A CLOCK
Seiji Odaka, Tokyo, Japan, assignor to Seikosha Co., Ltd., Japan
Filed Jan. 25, 1988, Ser. No. 147,769
Claims priority, application Japan, Jul. 24, 1987, 62-29994
Term of patent 14 years
U.S. Cl. D10—130

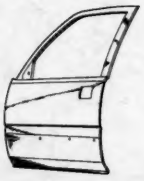
312,800
PENDULUM FOR A CLOCK
Tokiko Imai, Tokyo, Japan, assignor to Seikosha Co., Ltd., Japan
Filed Jan. 25, 1988, Ser. No. 147,773
Claims priority, application Japan, Aug. 4, 1987, 62-31704
Term of patent 14 years
U.S. Cl. D10—130

312,801
MEDALLION
Peter V. Ilaria, East Hanover, and William Macowski, Caldwell, both of N.J., assignors to Tropar Manufacturing Company, Inc., Florham Park, N.J.
Filed Mar. 7, 1988, Ser. No. 164,641
Term of patent 14 years
U.S. Cl. D11—115

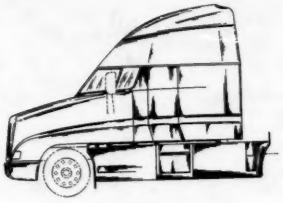
312,802
ARTIFICIAL TREE COVER FOR SEPTIC TANK VENT PIPE
Marc E. Bedard, Box 401, Intervale, N.H. 03845
Filed Nov. 21, 1988, Ser. No. 274,042
Term of patent 14 years
U.S. Cl. D11—118

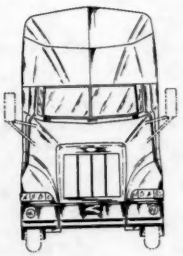
312,803
LUGGAGE AND PACKAGE CARRIER FOR A WHEELCHAIR
James Okamoto, Clovis, Calif., assignor to Motion Designs, Inc., Fresno, Calif.
Filed Nov. 21, 1988, Ser. No. 274,792
Term of patent 14 years
U.S. Cl. D12—133

312,804
AUTOMOBILE FRONT DOOR PANEL EXTERIOR SURFACE
Harumi Okano, Saitama, Japan, assignor to Honda Giken Kogyo Kabushiki Kaisha, Tokyo, Japan
Filed Sep. 9, 1987, Ser. No. 94,536
Term of patent 14 years
U.S. Cl. D12—196



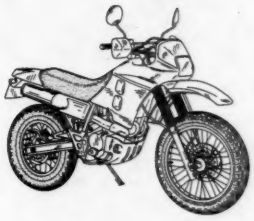
312,805
EXTERIOR SHELL OF A TRUCK CAB BODY
Huston Marlowe, Orinda, and John Lindsley, Felton, both of Calif., assignors to Paccar Inc., Bellevue, Wash.
Filed Sep. 15, 1988, Ser. No. 244,956
Term of patent 14 years
U.S. Cl. D12—96





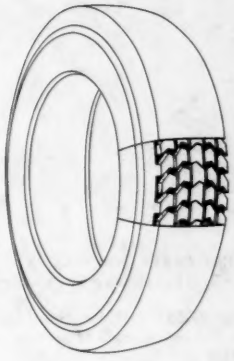
312,806
PICKUP TRUCK
Robert Page, Little Bay, Australia, assignor to Hynbrood Pty. Limited, Lilipilly, Australia
Filed Nov. 4, 1987, Ser. No. 116,740
Claims priority, application Australia, May 4, 1987, 1543/87
Term of patent 14 years
U.S. Cl. D12—98

312,807
MOTORCYCLE
Mitsuyoshi Kohama; Shinichi Yamase, and Hiroshi Takemori, all of Saitama, Japan, assignors to Honda Giken Kogyo Kabushiki Kaisha, Tokyo, Japan
Filed Jun. 26, 1987, Ser. No. 67,458
Claims priority, application Japan, Dec. 27, 1986, 61-52002
Term of patent 14 years
U.S. Cl. D12—110

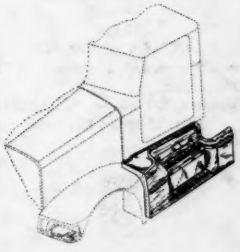


312,808
BICYCLE PUMP MOUNT
Kevin G. Rankin, 10426 Danube, Granada Hills, Calif. 91344
Filed Apr. 12, 1989, Ser. No. 337,109
Term of patent 14 years
U.S. Cl. D12—114

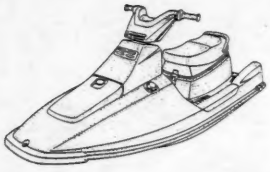
312,809
TIRE
Randall B. Clark, Greenville, and Edward M. Remick, Taylors, both of S.C., assignors to Michelin Recherche et Technique, Fribourg, Switzerland
Filed Aug. 24, 1988, Ser. No. 236,622
Term of patent 14 years
U.S. Cl. D12—147



312,810
EXTERIOR SHELL OF A TRUCK CAB STEP UNIT
Theresa D. Preslik, and Ross Sasamura, both of Fremont, Calif., assignors to Paccar Inc., Bellevue, Wash.
Filed Sep. 9, 1987, Ser. No. 94,926
The portion of the term of this patent subsequent to Dec. 4, 2004, has been disclaimed.
Term of patent 14 years
U.S. Cl. D12—203

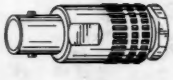


312,811
MOTORBOAT
Seiichi Ino, Akashi, Japan, assignor to Kawasaki Jukogyo Kabushiki Kaisha, Japan
Filed Nov. 9, 1988, Ser. No. 269,164
Claims priority, application Japan, Jun. 27, 1988, 63-25479
Term of patent 14 years
U.S. Cl. D12—307

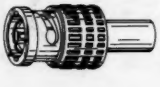


312,812
BATTERY CABLE CONNECTOR CLAMP
John M. Campbell, 8517 Lakehurst Dr., Oklahoma City, Okla. 73120
Filed Jun. 14, 1988, Ser. No. 206,688
Term of patent 14 years
U.S. Cl. D13—120

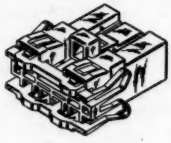
312,813
COAXIAL CONNECTOR
Takeshi Takizawa, Tokyo, Japan, assignor to Canare Electric Co., Ltd., Aichi, Japan
Filed Apr. 6, 1988, Ser. No. 178,283
Term of patent 14 years
U.S. Cl. D13—133



312,814
COAXIAL CONNECTOR
Takeshi Takizawa, Tokyo, Japan, assignor to Canare Electric Co., Ltd., Aichi, Japan
Filed Apr. 6, 1988, Ser. No. 178,284
Term of patent 14 years
U.S. Cl. D13—133

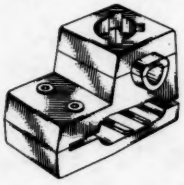


312,815
HOUSING FOR AN ELECTRICAL CONNECTOR
Takayuki Yamamoto, Shizuoka, Japan, assignor to Yazaki Corporation, Tokyo, Japan
Filed Dec. 22, 1987, Ser. No. 136,876
Claims priority, application Japan, Dec. 27, 1986, 61-51695
Term of patent 14 years
U.S. Cl. D13—147

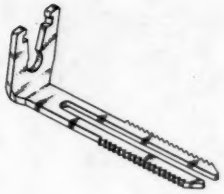


312,816
ELECTRICAL CONNECTOR OR SIMILAR ARTICLE
George Y. Huang, Huntington Beach, Calif., assignor to Turn-Luckily International, Inc., Huntington Beach, Calif.
Filed Jun. 22, 1988, Ser. No. 209,786
Term of patent 14 years
U.S. Cl. D13—147

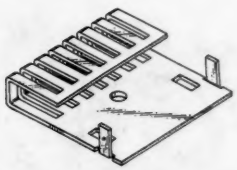
312,817
PLUG MOUNT
John J. Lazzeroni, and Melinda K. Lazzeroni, both of 7322 E. Stella Rd., Tucson, Ariz. 85730
Filed Jun. 24, 1987, Ser. No. 65,704
Term of patent 14 years
U.S. Cl. D13—154



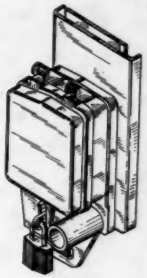
312,818
EXTENSION CORD LOCKING DEVICE
Bijan Bayat, 13743 Brookgreen Cir., Dallas, Tex. 75240
Filed Jul. 24, 1987, Ser. No. 77,324
Term of patent 14 years
U.S. Cl. D13—156

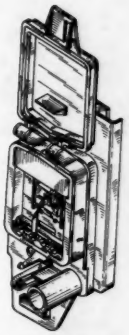


312,819
HEAT SINK OR SIMILAR ARTICLE
Larry D. Marshall, Dallas, Tex., assignor to Thermalloy, Inc., Dallas, Tex.
Filed Nov. 25, 1988, Ser. No. 275,545
Term of patent 14 years
U.S. Cl. D13—179

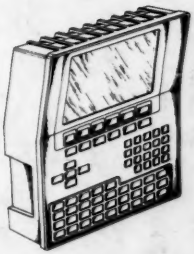


312,820
TELEPHONE NETWORK INTERFACE APPARATUS
Thomas J. Collins, Wall, and Anthony L. Nieves, Bradley Beach, both of N.J., assignors to Keptel, Inc., Tinton Falls, N.J.
Filed Mar. 4, 1988, Ser. No. 164,008
Term of patent 14 years
U.S. Cl. D14—240



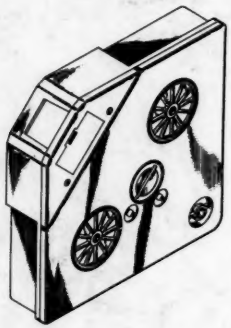


312,821
DATA INPUT/OUTPUT TERMINAL
James J. Kemp, Pleasant Plain, Ohio, assignor to Cincinnati Milacron Inc., Cincinnati, Ohio
Filed Apr. 8, 1988, Ser. No. 179,007
Term of patent 14 years
U.S. Cl. D14—100



312,822
PORTABLE COMPUTER
Noboru Watabe; Toyoshi Watanabe; Masatoshi Iwamoto, and Toru Ichihashi, all of Tokyo, Japan, assignors to NEC Corporation, Tokyo, Japan
Filed Apr. 3, 1989, Ser. No. 332,310
Claims priority, application Japan, Oct. 3, 1988, 63-38957
Term of patent 14 years
U.S. Cl. D14—106

312,823
FILM CASSETTE
Michael W. LaCourt; Ensley E. Townsend, and Douglas J. Pfaff, all of Rochester, N.Y., assignors to Eastman Kodak Company, Rochester, N.Y.
Filed Jan. 11, 1988, Ser. No. 142,882
Term of patent 14 years
U.S. Cl. D14—121



312,824
TELEVISION RECEIVER
Masaharu Kobayashi, Omiya, Japan, assignor to Sony Corporation, Tokyo, Japan
Filed Oct. 4, 1988, Ser. No. 252,972
Claims priority, application Japan, Apr. 15, 1988, 63-15362
Term of patent 14 years
U.S. Cl. D14—126

312,825
TAPE RECORDER
Masafumi Ito, Tokyo; Shigeru Hasegawa, Kodaira; Minoru Sube, Hachioji, and Yuji Sato, Chofu, all of Japan, assignors to Teac Corporation, Musashino, Japan
Filed Jun. 21, 1988, Ser. No. 210,647
Claims priority, application Japan, Jan. 28, 1988, 63-3230
Term of patent 14 years
U.S. Cl. D14—164

312,826

VIDEO CASSETTE RECORDER

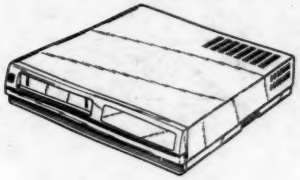
Sa Y. Hong, Seoul, Rep. of Korea, assignor to Gold Star Co., Ltd., Seoul, Rep. of Korea

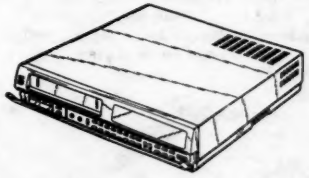
Filed May 13, 1988, Ser. No. 194,422

Claims priority, application Rep. of Korea, Nov. 17, 1987, 17284/1987[U]

Term of patent 14 years

U.S. Cl. D14—135





312,827

OPERATOR CAB FOR AN AGRICULTURAL MACHINE

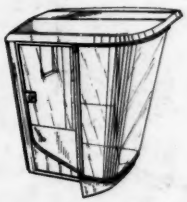
Geert R. Boddin, Zedelgem; Jean-Pierre Vandendriessche, Denderleeuw, and Daniel C. Witdoek, Hooglede, all of Belgium, assignors to Ford New Holland, Inc., New Holland, Pa.

Filed Mar. 14, 1988, Ser. No. 167,825

Claims priority, application United Kingdom, Sep. 15, 1987, 1044.894

Term of patent 14 years

U.S. Cl. D15—30



312,828

PLATING MACHINE FOR DEPOSITING PRECIOUS METALS ONTO DISCRETE COMPONENTS

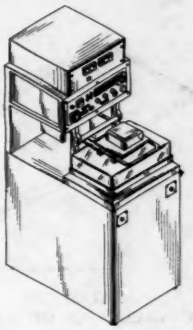
Neil T. Souter, Kingsthorpe, England, assignor to S. G. Owen (Northampton), Ltd., Northampton, England

Filed Sep. 2, 1987, Ser. No. 92,281

Claims priority, application United Kingdom, Mar. 2, 1987, 1040419

Term of patent 14 years

U.S. Cl. D15—199



312,829

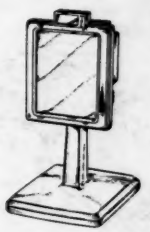
COMBINATION CAMERA AND MIRROR

Nobufusa Kuroki, Tokyo, Japan, assignor to Janome Sewing Machine Co. Ltd., Tokyo, Japan

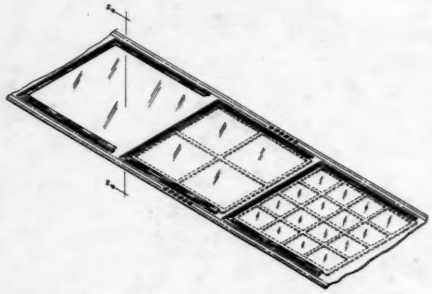
Filed Feb. 2, 1988, Ser. No. 151,474

Term of patent 14 years

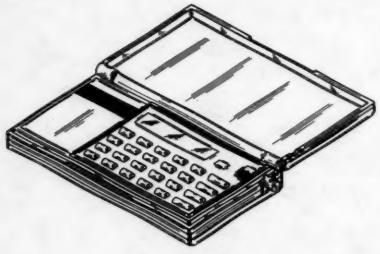
U.S. Cl. D16—214



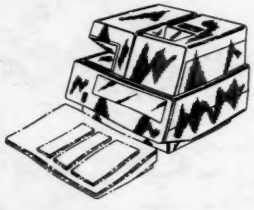
312,830
PHOTOGRAPHIC TRANSPARENCY HOLDER
John M. Coutts, Deerfield Beach, Fla., assignor to Visual Communication Productions Inc., Pompano Beach, Fla.
Filed Jan. 5, 1987, Ser. No. 981
Term of patent 14 years
U.S. Cl. D16—237



312,831
ELECTRONIC CALCULATOR WITH VOICE CLOCK
Masaji Sawada, and Katsuhiro Iida, both of Osaka, Japan, assignors to Sharp Corporation, Osaka, Japan
Filed Oct. 16, 1987, Ser. No. 109,848
Claims priority, application Japan, Apr. 17, 1987, 62-15197
Term of patent 14 years
U.S. Cl. D18—2

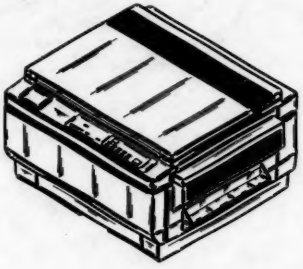


312,832
RETAIL TERMINAL OR SIMILAR ARTICLE
Donald L. Forsythe, Byesville, Ohio, assignor to NCR Corporation, Dayton, Ohio
Filed Jul. 17, 1987, Ser. No. 75,153
Term of patent 14 years
U.S. Cl. D18—4



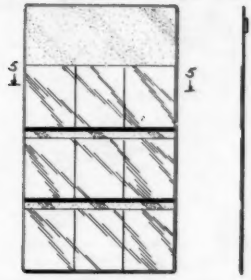
312,833
ELECTRONIC CALCULATOR
Naoki Kobayashi, Kawasaki, Japan, assignor to Casio Computer Co., Ltd., Tokyo, Japan
Filed Jun. 15, 1987, Ser. No. 62,821
Claims priority, application Japan, Feb. 6, 1987, 62-4388
The portion of the term of this patent subsequent to Aug. 7, 2004, has been disclaimed.
Term of patent 14 years
U.S. Cl. D18—7

312,834
COPYING MACHINE
Mikio Kosako, and Youichi Tatsuta, both of Osaka, Japan, assignors to Sharp Corporation, Osaka, Japan
Filed Feb. 25, 1988, Ser. No. 160,079
Claims priority, application Japan, Sep. 11, 1987, 62-37407
Term of patent 14 years
U.S. Cl. D18—37

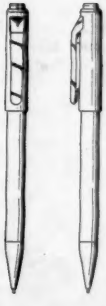


312,835
DISPLAY SHEET
Ronald A. Holm, Maplewood, Minn., assignor to Duratec Corporation, St. Paul, Minn.
Filed May 29, 1987, Ser. No. 55,749
Term of patent 14 years
U.S. Cl. D19—33

312,836
PHOTOGRAPH HOLDER
Roy M. Svee, Bloomington, Minn., assignor to J. B. Goodhouse, Inc., Bloomington, Minn.
Filed Dec. 27, 1988, Ser. No. 290,762
Term of patent 14 years
U.S. Cl. D19—33

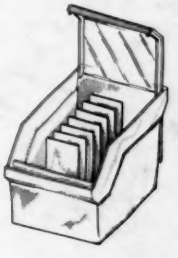


312,837
WRITING INSTRUMENT
Shigeo Oka, Tokyo, Japan, assignor to Pentel Kabushiki Kaisha, Tokyo, Japan
Filed Dec. 22, 1987, Ser. No. 136,637
Claims priority, application Japan, Jun. 30, 1987, 62-26566
Term of patent 14 years
U.S. Cl. D19—51

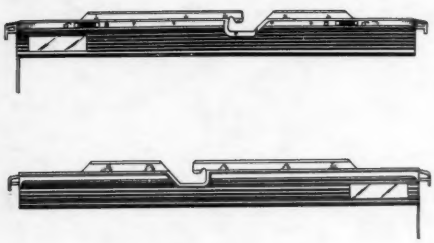


312,838
WRITING INSTRUMENT
Jean-Pierre Vitrac, Paris, France, assignor to Prodir S.A., Cadempino, Switzerland
Filed Oct. 19, 1989, Ser. No. 423,855
Claims priority, application Hague, Apr. 21, 1989, DM/013435
Term of patent 14 years
U.S. Cl. D19—51

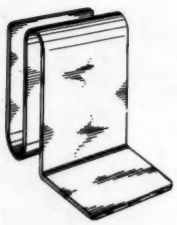
312,839
COMPUTER DISK FILE CONTAINER
Bradley M. Nemeth, San Francisco, Calif., assignor to Wendell Brooks, Inc., Fort Worth, Tex.
Filed Aug. 24, 1987, Ser. No. 88,192
Term of patent 14 years
U.S. Cl. D19—75



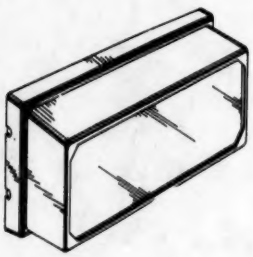
312,840
DOCUMENT HOLDER
Macy J. Price, Golden; Laurence G. Ball, Denver; Macy J. Price, Jr., Broomfield, and Mack E. Johnson, Arvada, all of Colo., assignors to Engineered Data Products, Inc., Broomfield, Colo.
Filed Jun. 23, 1987, Ser. No. 65,499
Term of patent 14 years
U.S. Cl. D19—90



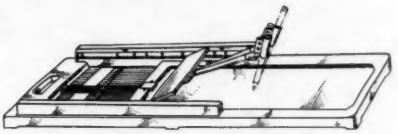
312,841
BOOKEND
Robert E. Hawes, Jr., Huntington Bay, and Eric Aaldenberg, Bayside, both of N.Y., assignors to Esselte Pendaflex Corporation, Garden City, N.Y.
Filed Mar. 22, 1988, Ser. No. 171,534
Term of patent 14 years
U.S. Cl. D19—34.1



312,842
ILLUMINATED DISPLAY SIGN
Ervin E. Younger; Gary M. Kickler, and E. Max Younger, all of Tribune, Kans., assignors to Nite-Glo Corp., Tribune, Kans.
Filed Mar. 28, 1988, Ser. No. 174,545
Term of patent 14 years
U.S. Cl. D20—42



312,843
DOUBLE-DRAWING TOY
Adolph E. Goldfarb, 19434 Londelius St., Northridge, Calif. 91324
Filed Jan. 11, 1988, Ser. No. 142,233
Term of patent 14 years
U.S. Cl. D21—59



312,844
RATTLE
Bryn Jones, 28 Thomas Street, Llanbradach, Caerphilly, Mid Glamorgan, Wales
Filed Dec. 8, 1988, Ser. No. 281,840
Claims priority, application United Kingdom, Jun. 29, 1988, 1051883
Term of patent 14 years
U.S. Cl. D21—65

312,845
TOY EGG
Takashi Matsuda, Tokyo, Japan, assignor to Takara Co., Ltd., Tokyo, Japan
Continuation-in-part of Ser. No. 920,305, Oct. 16, 1986, Pat. No. 4,736,943. This application Apr. 6, 1988, Ser. No. 178,087
Claims priority, application Japan, Mar. 25, 1988, 63-11784
Term of patent 14 years
U.S. Cl. D21—104

312,846

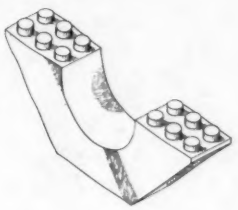
TOY BUILDING ELEMENT

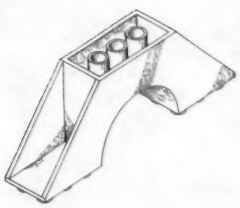
Edel S. Andersen, Randbol, Denmark, assignor to Interlego A.G., Baar, Switzerland

Filed May 9, 1989, Ser. No. 349,350

Term of patent 14 years

U.S. Cl. D21—108





312,847

AUDIBLE TOY BOAT

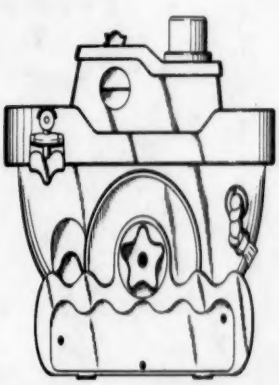
Tomoko Taninaka, Tokyo, Japan, assignor to Tomy Kogyo Co., Inc., Tokyo, Japan

Filed Apr. 1, 1988, Ser. No. 176,798

Claims priority, application Japan, Oct. 8, 1987, 62-41218

Term of patent 14 years

U.S. Cl. D21—130



312,848

MOTOR DRIVEN TOY FLOWER

Isamu Kataoka, Ichikawa, Japan, assignor to Takara Co., Ltd., Tokyo, Japan

Filed Mar. 3, 1989, Ser. No. 318,359

Claims priority, application Japan, Dec. 27, 1988, 63-51443

Term of patent 14 years

U.S. Cl. D21—150

312,849

BASE DRIVING UNIT FOR TOYS

Isamu Kataoka, Ichikawa, Japan, assignor to Takara Co., Ltd., Tokyo, Japan

Filed Mar. 3, 1989, Ser. No. 318,803

Claims priority, application Japan, Sep. 8, 1988, 63-35567

Term of patent 14 years

U.S. Cl. D21—150

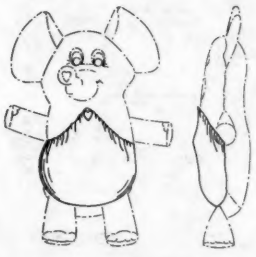
312,850
MOTOR DRIVEN TOY FLOWER
Isamu Kataoka, Ichikawa; Shinya Saitoh, Tokyo, and Shigeru Nakane, Narashino, all of Japan, assignors to Takara Co., Inc., Tokyo, Japan
Filed Mar. 3, 1989, Ser. No. 318,807
Claims priority, application Japan, Sep. 8, 1988, 63-35566
Term of patent 14 years
U.S. Cl. D21—150

312,851
MOTOR DRIVEN TOY FLOWER
Isamu Kataoka, Ichikawa, Japan, assignor to Takara Co., Ltd., Tokyo, Japan
Filed Mar. 8, 1989, Ser. No. 320,749
Claims priority, application Japan, Jan. 13, 1989, 1-1020
Term of patent 14 years
U.S. Cl. D21—150

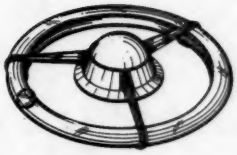
312,852
TUMBLER TOY
Virginia Wiseman, and Richard A. Wiseman, both of 5341 Waldo Pl., Los Angeles, Calif. 90041
Filed Jul. 28, 1987, Ser. No. 78,693
Term of patent 14 years
U.S. Cl. D21—166

312,853
WEIGHTLIFTER TOY
Virginia B. Wiseman, and Richard A. Wiseman, both of 5341 Waldo Pl., Los Angeles, Calif. 90041
Filed Jul. 28, 1987, Ser. No. 78,694
Term of patent 14 years
U.S. Cl. D21—166

312,854
POCKET APRON FOR A SOFT TOY
Boyd L. Meyer, Elburn, Ill., assignor to B. R. L. Inc., Glen Ellyn, Ill.
Filed Feb. 29, 1988, Ser. No. 161,832
Term of patent 14 years
U.S. Cl. D21—189



312,855
HEAD MOUNTABLE EXERCISER
Grant A. Silvey, 480 Wharf St., Bow, Wash. 98232
Filed Apr. 5, 1988, Ser. No. 177,688
Term of patent 14 years
U.S. Cl. D21—191



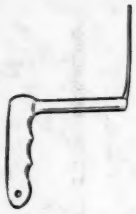
312,856
BALL GAME GOAL
John R. Boyd, Jr., 116 Montrose Ct., and Michael D. Boyd, 600 Cordillera Ct., both of Folsom, Calif. 95630
Filed Sep. 6, 1988, Ser. No. 240,892
Term of patent 14 years
U.S. Cl. D21—201

312,857
TETHERED BATTING PRACTICE AID
Isaac Montelongo, 3713 Kelso Way, Modesto, Calif. 95356
Filed Jan. 21, 1988, Ser. No. 146,361
Term of patent 14 years
U.S. Cl. D21—210

312,858
PUTTER HEAD
Donald A. Anderson, Huntington Beach, Calif., and Donald J. C. Sun, No. 6 Lane, 262 Chien Fong Road, Kang Shan Kaohsiung, Taiwan (820), assignors to Donald J. C. Sun, Kan San Kaohsiung, Taiwan, a part interest
Filed Apr. 14, 1988, Ser. No. 182,067
Term of patent 14 years
U.S. Cl. D21—219

312,859
FISHING LURE
Jim Gowing, Altus, Ark., assignor to Ebsco Industries, Inc., Leeds, Ala.
Filed Nov. 29, 1988, Ser. No. 278,142
Term of patent 14 years
U.S. Cl. D22—132

312,860
FISH HOOK THREADER
Paul Toogood, 1313 Sanborn Rd., Yuba City, Calif. 95991
Filed Oct. 20, 1988, Ser. No. 260,329
Term of patent 14 years
U.S. Cl. D22—149



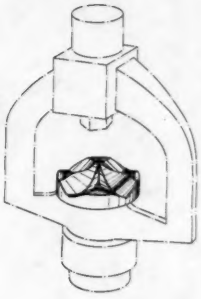
312,861
RAZOR
Michael Cerniglia, 1520 N. Woodlawn, Metairie, La. 70001
Filed Jun. 24, 1988, Ser. No. 211,403
Term of patent 14 years
U.S. Cl. D28—46

312,862
MANUAL VACUUM FILTRATION CONTAINER FOR *LIQUID SPECIMENS*
Vernon W. Klein, Kansas City, Mo., assignor to Marion Laboratories, Inc., Kansas City, Mo.
Continuation-in-part of Ser. No. 84,029, Aug. 10, 1987. This application Oct. 28, 1987, Ser. No. 113,729
Term of patent 14 years
U.S. Cl. D23—209

312,863
FILTER CARTRIDGE
Heinz Hankammer, Waldstrasse 4, 6204 Taunusstein 4, Fed. Rep. of Germany
Filed Sep. 21, 1988, Ser. No. 247,326
Claims priority, application Fed. Rep. of Germany, Mar. 26, 1988, 3810441; Apr. 30, 1988, 3814683
Term of patent 14 years
U.S. Cl. D23—209

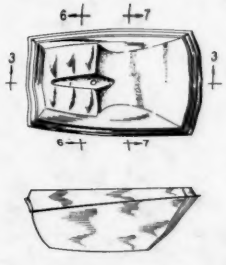
312,864
LAWN SPRINKLER HEAD
Dennis P. Wherry, Winter Park; Martin C. O'Brien, Deltona; Robert L. Horian, Heathrow, and Bruce M. McPherson, Maitland, all of Fla., assignors to Calibron, Inc., Lake Mary, Fla.
Filed Jan. 4, 1988, Ser. No. 140,834
Term of patent 14 years
U.S. Cl. D23—214

312,865
SPRINKLER WATER DISTRIBUTOR
Paul D. Davisson, Walla Walla, Wash., assignor to Nelson Irrigation Corporation, Walla Walla, Wash.
Filed Oct. 18, 1988, Ser. No. 259,577
Term of patent 14 years
U.S. Cl. D23—214

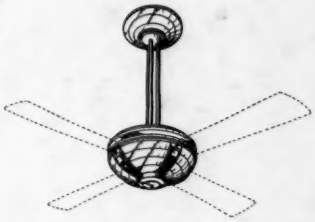


312,866
SPOUT
Thomas E. Gaffney, Sheboygan, and Thomas W. Hillebrand, Janesville, both of Wis., assignors to Kohler Co., Kohler, Wis.
Filed Jan. 13, 1987, Ser. No. 3,005
Term of patent 14 years
U.S. Cl. D23—255

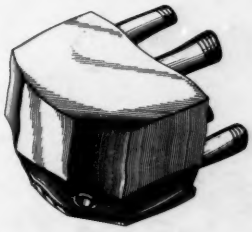
312,867
BATHTUB FOR HANDICAPPED
Alan B. Eke, 9407 Van Buren St., Blaine; Daniel A. Eke, 11846 - 16th La. NW., Coon Rapids, both of Minn. 55433, and Earl Johnson, R.R. 1, Dunnell, Minn. 56127
Filed Jan. 12, 1987, Ser. No. 2,129
Term of patent 14 years
U.S. Cl. D23—281



312,868
COMBINED OPAQUE GLASS BODY AND CEILING CANOPY FOR A CEILING FAN
Ron Rezek, Los Angeles, Calif., assignor to Beverly Hills Trading Company, Inc., Los Angeles, Calif.
Filed Jan. 3, 1990, Ser. No. 453,940
Term of patent 14 years
U.S. Cl. D23—377



312,869
OXY-FUEL BURNER FOR USE IN A METALLURGICAL FURNACE
Joseph S. Becker, Schnecksville; Arthur J. McAfee; Mark B. Wells, both of Allentown; Thomas C. Kidd, Zionsville, and John C. Mullane, Jr., Allentown, all of Pa., assignors to Air Products and Chemicals, Inc., Allentown, Pa.
Filed Nov. 16, 1987, Ser. No. 121,811
Term of patent 14 years
U.S. Cl. D23—415



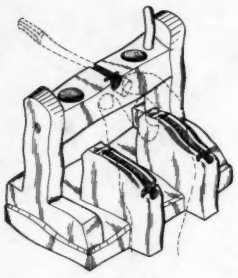
312,870

COMBINED BOTTLE AND SYRINGE SUPPORT FOR USE IN INSULIN WITHDRAWAL

James K. Young, 25460 Fairgrove, Woodhaven, Mich. 48183

Filed Jun. 24, 1987, Ser. No. 65,717
Term of patent 14 years

U.S. Cl. D24—8



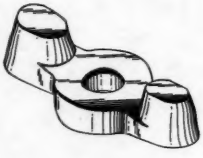
312,871

ALIGNMENT DEVICE FOR MOUNTING A DENTAL MODEL TO A BASE CAST

Thomas J. Mayclin, 5705 Dale Ave. S., Edina, Minn. 55436

Filed Feb. 16, 1988, Ser. No. 156,521
Term of patent 14 years

U.S. Cl. D24—10



312,872

DENTAL SUCTION HEAD

Thomas Mähl, Rundvägen 2, S-640 32 Malmköping, Sweden

Filed May 9, 1988, Ser. No. 191,473
Claims priority, application Sweden, Nov. 9, 1987, 87-2571
Term of patent 14 years

U.S. Cl. D24—10

312,873

SYRINGE JACKET WITH PLUNGER HANDLE

Gary D. Bradrick, Camarillo, and Robert B. Guthrie, Oxnard, both of Calif., assignors to Spectramed, Inc., Oxnard, Calif.

Filed Apr. 26, 1988, Ser. No. 186,187
Term of patent 14 years

U.S. Cl. D24—25

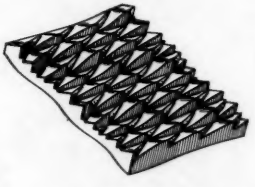
312,874

SURGICAL RASP INSERT

John A. Davison, and Robert J. Kellar, both of San Jose, Calif., assignors to Adler Instrument Company, Norcross, Ga.

Filed Sep. 28, 1983, Ser. No. 536,610
Term of patent 14 years

U.S. Cl. D24—28



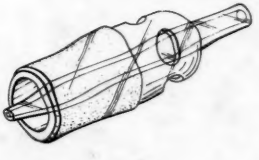
312,875

SHORT-TUBE HEATLESS CONCENTRATOR

Paul S. Spock, Spring Mills, Pa., assignor to Supelco Incorporated, Bellefonte, Pa.

Filed Dec. 16, 1987, Ser. No. 133,693
Term of patent 14 years

U.S. Cl. D24—29



312,876

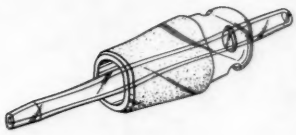
LONG-TUBE HEATLESS CONCENTRATOR

Paul S. Spock, Spring Mills, Pa., assignor to Supelco Inc., Bellefonte, Pa.

Filed Dec. 16, 1987, Ser. No. 133,697

Term of patent 14 years

U.S. Cl. D24—29



312,877

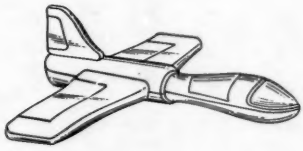
PACIFIER

Russell G. Flores, 1221 W. 3rd St., Sedalia, Mo. 65301

Filed Aug. 29, 1989, Ser. No. 400,044

Term of patent 14 years

U.S. Cl. D24—45



312,878

FEEDING BOTTLE FOR BABY

John V. Mariol, Cincinnati, Ohio, assignor to James F. Mariol, Cincinnati, Ohio

Filed Jan. 14, 1988, Ser. No. 144,026

Term of patent 14 years

U.S. Cl. D24—47

312,879

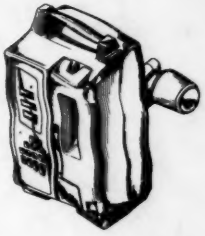
COMBINED VOLUMETRIC PUMP AND CONTROLLER

Michael R. Aten, San Diego, Calif., assignor to IMED Corporation, San Diego, Calif.

Filed Mar. 18, 1988, Ser. No. 169,757

Term of patent 14 years

U.S. Cl. D24—51



312,880

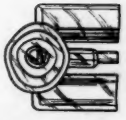
NEONATAL SUCTION VALVE

Balazs I. Bodai, 2913 Jade Cove Ct., Sacramento, Calif. 95821, and Stephen Briggs, 6807 Hickory Ave., Orangevale, Calif. 95662

Filed Mar. 4, 1988, Ser. No. 163,875

Term of patent 14 years

U.S. Cl. D24—53



312,881

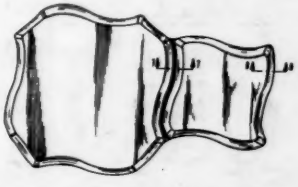
INTERLOCKING PAVING BLOCK

Friedrich S. Naether, Highway 67, Box 140B, Freedom, Ind. 47431

Filed Feb. 22, 1989, Ser. No. 314,210

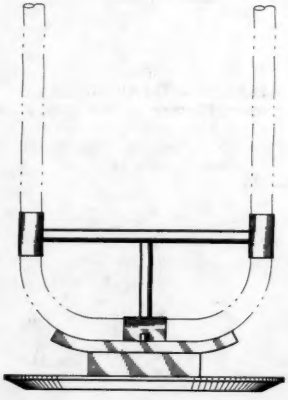
Term of patent 14 years

U.S. Cl. D25—113

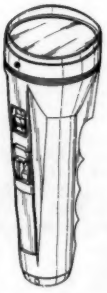


312,882
WINDOW COMPONENT EXTRUSION
Dennis Westphal, Galva, and Jonathan Piles, McPherson, both of Kans., assignors to CertainTeed Corporation, Valley Forge, Pa.
Filed Jan. 13, 1989, Ser. No. 297,477
Term of patent 14 years
U.S. Cl. D25—124

312,883
U-SHAPED CANDLE HOLDER
Patrick J. O'Donnell, 3040 Connor St., Salt Lake City, Utah 84109
Filed Dec. 7, 1989, Ser. No. 447,025
Term of patent 14 years
U.S. Cl. D26—20



312,884
FLASHLIGHT
Kwok H. Liu, New Territories, Hong Kong, assignor to Transistolite Manufacturing Limited, Hong Kong
Filed Sep. 10, 1987, Ser. No. 95,541
Claims priority, application United Kingdom, Mar. 10, 1987, 1040613
Term of patent 14 years
U.S. Cl. D26—46



312,885
MAGNETICALLY MOUNTED GOOSENECK LAMP
Jean-Marie W. Louis, Leuvensesteenweg 146, 3210 Tielt-Winge, Belgium
Filed Sep. 6, 1988, Ser. No. 241,126
Term of patent 14 years
U.S. Cl. D26—60

312,886

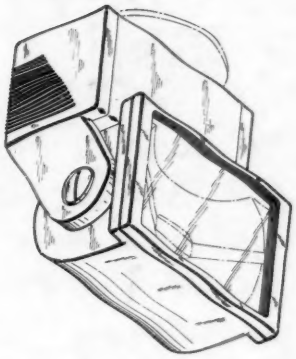
ADJUSTABLE LIGHTING FIXTURE

Tobias Brown, Oak Park, Ill., assignor to Alkco Manufacturing Company, Franklin Park, Ill.

Filed Apr. 14, 1988, Ser. No. 182,077

Term of patent 14 years

U.S. Cl. D26—63



312,888

ADJUSTABLE LAMP

Ken Goldner, 323 E. 78th St., New York, N.Y. 10021

Filed Jun. 1, 1988, Ser. No. 201,710

Term of patent 14 years

U.S. Cl. D26—65

312,887

HINGED LAMP

Ludovico Magistretti, Milan, Italy, assignor to Diver Viss S.r.l., Italy

Filed Feb. 22, 1988, Ser. No. 159,060

Claims priority, application Italy, Aug. 27, 1987, 222198/87[U]

Term of patent 14 years

U.S. Cl. D26—65

312,889

DECORATIVE OUTDOOR MARKER LAMP

Robert A. Swadell, Henderson, Nev., assignor to Geisha Corporation, Henderson, Nev.

Filed Sep. 6, 1988, Ser. No. 242,457

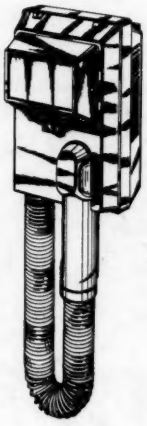
Term of patent 14 years

U.S. Cl. D26—168

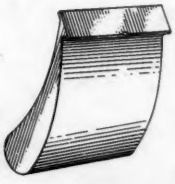
312,890
LUMINAIRE
Wayne W. Compton, Chino Hills, Calif., assignor to Kidde Consumer Durables Corporation, City of Industry, Calif.
Filed Feb. 19, 1988, Ser. No. 158,361
Term of patent 14 years
U.S. Cl. D26—69

312,891
TABLE LAMP
Philippe Starck, Paris, France, assignor to Flos S.p.A., Bovezzo, Italy
Filed Oct. 6, 1988, Ser. No. 254,485
Claims priority, application Italy, Apr. 6, 1988, 6975-B/88
Term of patent 14 years
U.S. Cl. D26—106

312,892
WALL-MOUNTED HAIR DRYER
Allen F. Eberts, Batavia, Ill., assignor to The TonJon Company, Aurora, Ill.
Filed Sep. 28, 1988, Ser. No. 250,483
Term of patent 14 years
U.S. Cl. D28—12



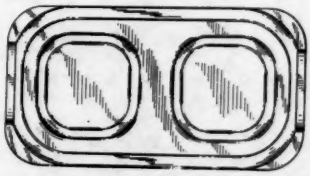
312,893
RAZOR BLADE HOLDER
Flemming B. Hansen, No. 126 Tagensvej, Room 612, DK-2200 Copenhagen N, Denmark
Filed Jul. 2, 1987, Ser. No. 70,876
Term of patent 14 years
U.S. Cl. D28—48



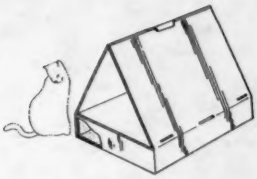
312,894
HOLDER FOR DENTAL TAPE
Jorgen Schroder-Jorgensen, 2, Sandager, Hovslund, DK-6230 Roedekro, Denmark
Filed Sep. 20, 1989, Ser. No. 409,875
Claims priority, application Denmark, Mar. 20, 1989, 306/89
Term of patent 14 years
U.S. Cl. D28—64

312,895
PET FEEDING DISH
Charles R. Goetz, Carnegie, Pa., assignor to Alco Industries, Inc., Valley Forge, Pa.
Filed Aug. 10, 1988, Ser. No. 230,379
Term of patent 14 years
U.S. Cl. D30—129

312,896
DUAL COMPARTMENT PET FEEDING DISH
Charles R. Goetz, Carnegie, Pa., assignor to Alco Industries, Inc., Valley Forge, Pa.
Filed Aug. 10, 1988, Ser. No. 230,535
Term of patent 14 years
U.S. Cl. D30—130



312,897
KITTY LITTER BOX
Eleanor A. Splane, 1649 S. Downing St., Seaside, Oreg. 97138
Filed Jul. 22, 1987, Ser. No. 76,556
Term of patent 14 years
U.S. Cl. D30—161



312,898
LITTER BAGGING TOOL
John C. Roberts, 1309 Troon Dr., Edmond, Okla. 73034
Filed Feb. 6, 1990, Ser. No. 475,606
Term of patent 14 years
U.S. Cl. D30—162

312,899
GARMENT DRYING BAG
Richard E. Faulkner, 1021 Alberta Pl., San Diego, Calif. 92103
Filed Dec. 8, 1986, Ser. No. 939,018
Term of patent 14 years
U.S. Cl. D32—8

312,900

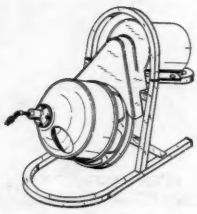
PORTABLE ROTATING DRAIN CLEANER

V. Lee Russell, Bethany, and Kerry Cannon, Moore, both of Okla., assignors to National Manufacturing & Supply Corporation, Oklahoma City, Okla.

Filed Mar. 11, 1988, Ser. No. 166,916

Term of patent 14 years

U.S. Cl. D32—14



312,901

ELECTRIC VACUUM CLEANER

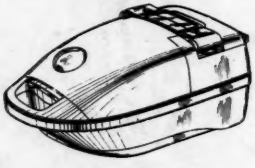
Tomoyuki Miyata, Tokyo; Kohichi Hasegawa, Tachikawa; Masao Sunagawa, Hitachi; Akira Iwao, Kitaibaraki, and Naruhiko Suzuki, Hitachi, all of Japan, assignors to Hitachi, Ltd., Tokyo, Japan

Filed Mar. 27, 1989, Ser. No. 328,697

Claims priority, application Japan, Sep. 26, 1988, 63-37453

Term of patent 14 years

U.S. Cl. D32—21



312,902

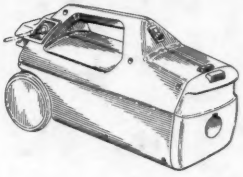
VACUUM CLEANER

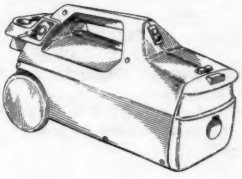
John D. Essex, and David W. Moine, both of North Canton, Ohio, assignors to The Hoover Company, North Canton, Ohio

Filed Jan. 30, 1989, Ser. No. 303,388

Term of patent 14 years

U.S. Cl. D32—24





312,903

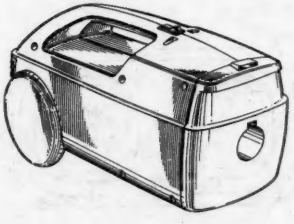
VACUUM CLEANER

John D. Essex, and David W. Moine, both of North Canton, Ohio, assignors to The Hoover Company, North Canton, Ohio

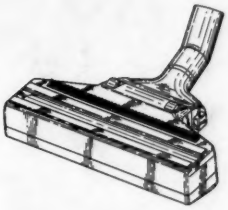
Filed Jan. 30, 1989, Ser. No. 303,390

Term of patent 14 years

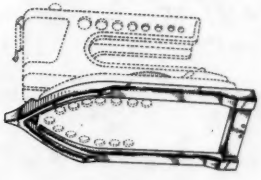
U.S. Cl. D32—24



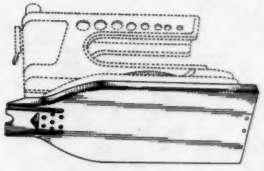
312,904
VACUUM CLEANER NOZZLE
Peter Wörwag, Romanshorn, Switzerland, assignor to Düpro AG, Romanshorn, Switzerland
Filed May 8, 1989, Ser. No. 348,763
Claims priority, application Fed. Rep. of Germany, Nov. 8, 1988, 8803041
Term of patent 14 years
U.S. Cl. D32—32



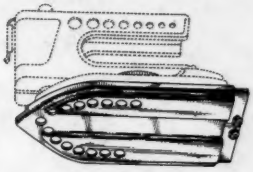
312,905
STEAM IRON SOLE PLATE FOR HIGH NAP FABRICS OR SIMILAR ARTICLE
Donald R. Davidson, Chatham; Gerald J. Creed, Rahway, and Howard D. Rogers, Fanwood, all of N.J., assignors to SSMC Inc., Edison, N.J.
Filed Sep. 23, 1988, Ser. No. 248,208
Term of patent 14 years
U.S. Cl. D32—71



312,906
STEAM IRON SOLE PLATE FOR ACCOMMODATING BUTTONS AND PLEATS OR SIMILAR ARTICLE
Donald R. Davidson, Chatham; Gerald J. Creed, Rahway, and Howard D. Rogers, Fanwood, all of N.J., assignors to SSMC Inc., Edison, N.J.
Filed Sep. 26, 1988, Ser. No. 249,467
Term of patent 14 years
U.S. Cl. D32—71

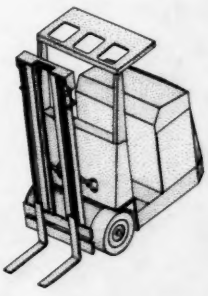


312,907
STEAM IRON SOLE PLATE FOR ACCOMMODATING ZIPPERS OR SIMILAR ARTICLE
Donald R. Davidson, Chatham; Gerald J. Creed, Rahway, and Howard D. Rogers, Fanwood, all of N.J., assignors to SSMC Inc., Edison, N.J.
Filed Sep. 26, 1988, Ser. No. 249,468
Term of patent 14 years
U.S. Cl. D32—71



312,908
PORTABLE POCKET TOBACCO SPITTOON
Charles H. Muchmore, P.O. Box 17245, St. Bernard, Ohio 45217
Filed Nov. 4, 1988, Ser. No. 266,999
Term of patent 14 years
U.S. Cl. D34—2

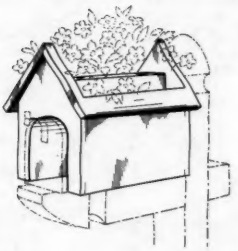
312,909
LIFT TRUCK
Kurt K. Larsen, and Pete Santiago, both of Pell City, Ala., assignors to Blue Giant Equipment Corporation, Pell City, Ala.
Filed May 23, 1988, Ser. No. 197,812
Term of patent 14 years
U.S. Cl. D34—34



312,910
DEEP BOWL
Eva S. Jeresano, Metro Manila, Philippines, assignor to Decra Stone, Inc., Prior Lake, Minn.
Filed Dec. 9, 1986, Ser. No. 939,789
Term of patent 14 years
U.S. Cl. D34—42

312,911
TRAY
Evelyn H. Jeresano, Capalonga, Philippines, assignor to Decra Stone, Inc., Prior Lake, Minn.
Filed Dec. 9, 1986, Ser. No. 939,895
Term of patent 14 years
U.S. Cl. D34—42

312,912
COMBINED MAILBOX COVER AND PLANTER BOX
Thomas H. Klahre, P.O. Box 31, Edison, N.J. 08818
Filed Jun. 28, 1988, Ser. No. 214,621
Term of patent 14 years
U.S. Cl. D99—29



LIST OF PATENTEES

TO WHOM

PATENTS WERE ISSUED ON THE 11TH DAY OF DECEMBER, 1990

NOTE.—Arranged in accordance with the first significant character or word of the name (in accordance with city and telephone directory practice).

A. Ahlstrom Corporation: *See*—
Elvander, Hans I.; and Malmstrom, Rolf E., 4,976,776, Cl. 75-483.000.

A,C,R. Co., Ltd.: *See*—
Ogawa, Akio; Shimada, Masahiko; and Ando, Kazuhiko, 4,977,201, Cl. 523-400.000.

A/S Ferrosan: *See*—
Jacobsen, Poul; Nielsen, Flemming E.; Honore, Tage; and Drejer, Jorgen, 4,977,155, Cl. 514-250.000.

A&W Fullarton Limited: *See*—
Halliday, George M., 4,976,353, Cl. 206-386.000.

Aaltonen, Pertti: *See*—
Selin, Lauri; Aaltonen, Pertti; and Illi, Heikki, 4,976,844, Cl. 204-408.000.

AB Varnamo Gummifabrik: *See*—
Bjorkqvist, Markku R., 4,976,475, Cl. 242-115.000.

AB Volvo: *See*—
Andersson, Sven, 4,976,671, Cl. 475-299.000.
Hultberg, Jimmy, 4,976,344, Cl. 198-418.200.

ABB Power T&D Company: *See*—
Munday, Mark L.; Doby, William P.; and Loose, Robert A., 4,977,368, Cl. 324-142.000.

Abbas, Christiaan, to BBC Brown, Boveri Ltd. Turn-off semiconductor component and use thereof. 4,977,438, Cl. 357-38.000.

Abbott Laboratories: *See*—
Gauthier, Robert J.; and Levinson, Robert S., 4,976,683, Cl. 604-29.000.
Rosenberg, Saul H.; Luly, Jay R.; and Plattner, Jacob J., 4,977,277, Cl. 549-215.000.

Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A. Method of construction of multiple-string wells. 4,976,322, Cl. 175-57.000.

Abe, Atsushi: *See*—
Miyabayashi, Nobuyoshi; Hosono, Masami; and Abe, Atsushi, 4,977,533, Cl. 364-726.000.

Abe, Mitsuyuki: *See*—
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.

Abe, Tetsuya: *See*—
Fujiwara, Yoshio; Kobayashi, Naotake; Shinohara, Satoru; and Abe, Tetsuya, 4,977,136, Cl. 503-227.000.

Abex Corporation: *See*—
Edwards, Keith R., 4,976,800, Cl. 156-151.000.

Abf, Akira: *See*—
Takase, Haruo; Uenaka, Kazushige; Abf, Akira; and Fujita, Yoshihiro, 4,976,870, Cl. 210-668.000.

Abhari, Reza S.: *See*—
McLellan, Michael F.; and Abhari, Reza S., 4,976,389, Cl. 224-328.000.

Abiko, Toshio: *See*—
Tsukamoto, Katsuya; and Abiko, Toshio, 4,977,406, Cl. 343-700.0MS.

Abujudom, David N., II; Dougherty, Thomas J.; Inkmann, Mark S.; Johnson, Richard T.; Karolek, Neil C.; and Saari, David W., to Globe-Union Inc. Battery module for the engine compartment of an automobile. 4,976,327, Cl. 180-68.200.

Acciacca, Allan C.; and Gergoe, Bela, to General Motors Corporation. Release for closure panel pull down mechanism. 4,976,478, Cl. 292-201.000.

ACCO World Corporation: *See*—
Perdue, Thomas E., Jr.; Bransky, Jeffrey D.; Carvell, William S.; Dettloff, David E.; Ischay, Duane K.; and Oberg, Kenneth H., 4,976,373, Cl. 220-335.000.

Actran Systems, Inc.: *See*—
Martin, Robert J.; and Lane, Barry L., 4,977,380, Cl. 331-74.000.

Adair, Paul C.: *See*—
Gottschalk, Peter; Neckers, Douglas C.; Schuster, Gary B.; Adair, Paul C.; and Pappas, S. Peter, 4,977,511, Cl. 364-473.000.

Adamolle, Bruno J. M.: *See*—
Fardeau, Michel G. J.; and Adamolle, Bruno J. M., 4,977,605, Cl. 382-51.000.

Adams, Anthony B., to Ling Dynamic Systems Limited. Electromagnetic vibration generators. 4,977,342, Cl. 310-20.000.

Adams, Kenneth H., to Automated Wafer Systems. Purge tube with flosting end cap for loading silicon wafers into a furnace. 4,976,612, Cl. 432-239.000.

Adams, Paul E., to Lubrizol Corporation, The. Coupled polyamine lubricant additives derived from hydrocarbyl polynitriles and polyamines. 4,976,881, Cl. 252-47.000.

Adamski, Joseph R.; and Sklenak, John S., to Raytheon Company. Air filter and particle removal system. 4,976,749, Cl. 55-6.000.

Adhya, Mita: *See*—
Hwa, Chih M.; Kelly, John A.; and Adhya, Mita, 4,977,292, Cl. 558-81.000.

Adi Diagnostics, Inc.: *See*—
Raybould, Torquil J. G.; and Takahashi, Miyoko, 4,977,081, Cl. 435-70.210.

Adkins, Richard C., to Cranfield Institute. Aerofoil/hydrofoil. 4,976,349, Cl. 244-207.000.

Adolph Coors Company: *See*—
Grims, Conrad M.; Johansson, Bert E.; and Hahn, Roger A., 4,976,131, Cl. 72-347.000.

Adrian, Willy; and Moldenhaur, Detlev B., to Otis Elevator Company. Escalator handrail obstruction device with sensors. 4,976,345, Cl. 198-323.000.

Advanced Cardiovascular Systems, Inc.: *See*—
Machold, Timothy R.; Mar, Craig E.; Mueller, Richard L., Jr.; and Shanahan, John P., 4,976,720, Cl. 606-194.000.

Advanced Micro Devices, Inc.: *See*—
Haskell, Jacob D., 4,977,108, Cl. 437-229.000.

Advanced Pulmonary Technologies, Inc.: *See*—
Gluck, Eric H.; Thompson, Brian E.; and Hall, Michael A., 4,976,261, Cl. 128-207.150.

Advanced Sleep Products: *See*—
Luchonok, Jeffrey J., 4,975,995, Cl. 5-450.000.

Aerospace Controls Corporation: *See*—
Malcolm, Timothy M.; and Latta, Garland H., Jr., 4,977,316, Cl. 250-231.130.

Agano, Toshitaka; and Saotome, Shigeru, to Fuji Photo Film Co., Ltd. Method and apparatus for minimizing image signal noise, and radiation image read-out method and apparatus. 4,977,322, Cl. 250-327.200.

Agawa, Jiro: *See*—
Irie, Nobuhiko; and Agawa, Jiro, 4,976,807, Cl. 156-405.100.

Agency of Industrial Science and Technology: *See*—
Onishi, Toshitada; Higuchi, Noboru; and Ishii, Itaru, 4,977,039, Cl. 428-623.000.

Agfa-Gevaert Aktiengesellschaft: *See*—
Renner, Gunter; and Matejec, Reinhart, 4,977,072, Cl. 430-549.000.

Aghion, Michael, to Michael's France. Universal intramedullary nail, particularly for the thighbone. 4,976,714, Cl. 606-62.000.

Agius, Michel, to Selas S.A. Installation for curving and tempering a sheet of glass. 4,976,763, Cl. 65-287.000.

Agostinelli, John A.; and Staudenmayer, William J., to Eastman Kodak Company. Ceramic cupric oxide coated pressure roll for image fixing. 4,976,877, Cl. 219-216.000.

Agreda, Victor H.; and Steinmetz, Guy R., to Eastman Kodak Company. Process for the recovery of elemental iodine from alkyl iodides. 4,976,947, Cl. 423-502.000.

Agricultural Genetics Company Limited: *See*—
Callanain, Tadgh, 4,976,975, Cl. 426-36.000.

Aisin Aw Co., Ltd.: *See*—
Sakakibara, Shiro; and Fukaya, Takaharu, 4,976,347, Cl. 192-20.000.

Aisin Takaoka Co., Ltd.: *See*—
Tsuruta, Kozo; and Yamada, Yuichi, 4,976,601, Cl. 425-182.000.

Ajinomoto Company, Incorporated: *See*—
Itagaki, Takaharu; Okada, Hiroyoshi; Miyake, Masao; Kobayashi, Takaaki; Tosa, Takahumi; and Satou, Hiroyuki, 4,976,976, Cl. 426-69.000.

Akamatsu, Hideo: *See*—
Iijima, Toshifumi; Yamada, Yoshitaka; Kumashiro, Kenji; Akamatsu, Hideo; and Kamio, Takashi, 4,977,069, Cl. 430-506.000.

Akamatsu, Masuo; and Suzuki, Masayoshi, to Hitachi, Ltd. Intake air flow rate measuring apparatus for use in internal combustion engine. 4,976,140, Cl. 73-118.200.

Akao, Michitoshi: *See*—
Asai, Shin; Akao, Michitoshi; Katoh, Tokunori; Sakakibara, Kenji; Izaki, Takesi; and Morisaki, Hiroshi, 4,977,437, Cl. 355-27.000.

Akao, Mutsuo, to Fuji Photo Film Co., Ltd. Packaging material. 4,977,033, Cl. 428-516.000.

Akashi, Shunji; and Oda, Kiyoshi, to Yoshida Kogyo K. K. Automatic lock slider for slide fastener. 4,976,014, Cl. 24-421.000.

Akazawa, Toshiyuki; Okaya, Takuji; Inoue, Takashi; and Kobayashi, Toshitaka, to Kuraray Co., Ltd.; and Nippon Petrochemicals Co., Ltd. Adhesive resin composition, laminated material using it and resin composition containing it. 4,977,212, Cl. 525-57.000.

Ake, DuWain K., to Spectra-Physics, Inc. Detection and display device. 4,976,538, Cl. 356-4.000.

Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; and Mikami, Nakao, to Kyocera Corporation; and Takeda Chemical Industries, Ltd. Molded germanium and ceramic article for skin contact medical treatment. 4,976,705, Cl. 604-304.000.

Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; Tachibana, Hideki; and Tanase, Setsumi, to Tachibana Textile Fabrics, Co., Ltd.; and Takeda Chemical Industries, Ltd. Sheet material of germanium and ceramic for skin contact medical treatment. 4,976,706, Cl. 604-304.000.

Akin, Timothy W.; and Bindi, Rudi, to Akin, Timothy W. Hyperextension brace. 4,976,257, Cl. 128-78.000.

Akitya, Noboru: *See*—
Kitahara, Koichi; Shimada, Takashi; Iwata, Keiichi; and Akitya, Noboru, 4,976,942, Cl. 423-294.000.

Akiyama, Hirokatsu: *See*—
Obuchi, Yasuji; Hamada, Akira; Akiyama, Hirokatsu; and Nakamura, Yasuhisa, 4,976,182, Cl. 84-462.000.

Akutsu, Eiichi; Soga, Hiroh; and Ando, Shigehito, to Fuji Xerox Co., Ltd. Ink recording medium regenerating method. 4,976,986, Cl. 427-27.000.

Akutsu, Tsukasa: *See*—
Tani, Toshio; Kamiyama, Osamu; Matsuki, Noborn; Fukuda, Ryosaku; Akutsu, Tsukasa; and Nakatsugawa, Hiroshi, 4,976,826, Cl. 204-12.000.

Akuzawa, Noboru: *See*—
Matsumoto, Yuto; Yamaga, Hiroyoshi; Akuzawa, Noboru; and Obara, Toshio, 4,977,249, Cl. 534-696.000.

Akzo N.V.: *See*—
Wechs, Friedbert, 4,976,859, Cl. 210-500.230.
Wieringa, Johannes H., 4,977,158, Cl. 514-285.000.

Al-Site Corp.: *See*—
Nyman, Michael S., 4,976,532, Cl. 351-158.000.

Albeck, Michael: *See*—
Grossman, Shlomo; and Albeck, Michael, 4,976,960, Cl. 424-195.100.

Alcan International Limited: *See*—
Boivin, Richard F.; Huni, Jean-Paul R.; and LeBlanc, Robert, 4,976,841, Cl. 204-243.00M.

Alcatel NA, Inc.,: *See*—
Powell, William E., 4,977,478, Cl. 361-160.000.

Aldrich, W. Daniel, to Niagara Lockport Industries Inc. Built up seam for papermakers fabric. 4,976,293, Cl. 139-383.0AA.

Aldridge, Billie A., Jr.; and Stone, Roger J. Test assembly for machine tool having hydraulic pallet assemblies. 4,976,025, Cl. 29-563.000.

Alfa-Laval Thermal AB: *See*—
Dahlgren, Arthur; Kallrot, Magnus; and Stromblad, Mats, 4,976,313, Cl. 165-167.000.

Alfred Teves GmbH: *See*—
Budecker, Ludwig, 4,977,606, Cl. 417-538.000.

Alfrey, Anthony J.: *See*—
Herbst, Richard L.; Alfrey, Anthony J.; and Streeby, Shawn D., 4,977,566, Cl. 372-33.000.

Ali, Eren: *See*—
Gill, David C.; and Ali, Eren, 4,976,465, Cl. 239-224.000.

Ali, Fazal: *See*—
Podell, Allen F.; Mitchell, Scott W.; Moghe, Sanjay B.; and Ali, Fazal, 4,977,382, Cl. 333-164.000.

Allaire, Roger A., to Corning, Incorporated. Method for making ceramic matrix composite article. 4,976,761, Cl. 65-3.200.

Allen, Richard C., to Photonics Corporation. Infrared data communications. 4,977,618, Cl. 455-607.000.

Allflex Europe S.A.: *See*—
Porcher, Alain R.; and Martin, Jean-Claude, 4,976,925, Cl. 422-100.000.

Allied-Signal Inc.: *See*—
Mani, Krishnamurthy N.; Chlanda, Frederick P.; and Chiao, Yu-Chih, 4,976,838, Cl. 204-182.300.

Alloy Surfaces Company, Inc.: *See*—
Baldi, Alfonso L., 4,977,036, Cl. 428-553.000.

Alps Electric Co., Ltd.: *See*—
Gotoh, Masaki, 4,977,486, Cl. 362-27.000.

Altank Industries Ltd.: *See*—
Reid, Roy C., 4,976,110, Cl. 62-45.100.

Altfeld, Klaus: *See*—
Oerlemans, Peter; Marrett, Rolf; Eckert, Armin; and Altfeld, Klaus, 4,976,845, Cl. 208-39.000.

Altherr, Russell G., to AMSTED Industries Incorporated. Knuckle pin retainer for railway vehicle coupler. 4,976,363, Cl. 213-155.000.

Altmanshofer, Robert D.: *See*—
Rodriguez-Cavazos, Enrique; Altmanshofer, Robert D.; Parker, Robert P.; and Hall, Estill T., Jr., 4,977,355, Cl. 315-368.000.

Aluminum Company of America: *See*—
Phelps, Frankie E.; and Leech, Gerald W., 4,977,113, Cl. 501-98.000.

ALZA Corporation: *See*—
Theeuwes, Felix; and Wong, Patrick S. L., 4,976,966, Cl. 424-473.000.

Amano, Shigeru; Takarabe, Tsuyoshi; Oda, Hiroshi; Nakamori, Takashi; Watanabe, Satoshi; and Taira, Masamichi, to Nippon Steel Corporation. Blast furnace operation management method and apparatus. 4,976,780, Cl. 75-375.000.

Amemiya, Shigeo: *See*—
Iguchi, Kazuo; Soejima, Tetsuo; Watanabe, Toshiaki; and Amemiya, Shigeo, 4,977,558, Cl. 370-112.000.

American Cyanamid Company: *See*—
McGahren, William J.; and Ellestad, George A., 4,977,143, Cl. 514-25.000.
Morin, Louis G., 4,976,828, Cl. 204-28.000.
Tomcufcik, Andrew S.; Dixon, James S.; Epstein, Joseph W.; Birnberg, Gary H.; and Fanshawe, William J., 4,977,189, Cl. 514-603.000.

American Greetings Corporation: *See*—
Hardy, Stephen N., 4,976,359, Cl. 211-58.000.

American Packaging Corporation: *See*—
Yannuzzi, Gilbert N., Jr.; and Muhs, Jeffrey D., 4,976,674, Cl. 493-195.000.

American Stress Technologies, Inc.: *See*—
Tiitto, Seppo I., 4,977,373, Cl. 324-209.000.

American Tourister, Inc.: *See*—
Bieber, David; and Carpenter, Lester E., 4,976,340, Cl. 190-109.000.

American Trencher, Inc.: *See*—
Schnittjer, Bradley J., 4,976,095, Cl. 56-350.000.

Ametek, Inc.: *See*—
Meyers, Peter V.; Liu, Chung-Heng; and Frey, Timothy J., 4,977,097, Cl. 437-4.000.

Amgen: *See*—
Bitter, Grant A., 4,977,092, Cl. 435-320.000.

Amidon, Gordon L.: *See*—
Meyer, James H.; Amidon, Gordon L.; and Dressman, Jennifer B., 4,976,949, Cl. 424-1.100.

Amikura, Takashi: *See*—
Tamekuni, Yasuhiro; Amikura, Takashi; and Ohara, Toru, 4,977,457, Cl. 358-227.000.

Ammende, Sonya; Erdmann, Hartmut; Etzkorn, Heinz-Werner; and Zucholl, Klaus, to Battelle-Institut e.V. Method for making a sensor for monitoring hydrogen concentrations in gases. 4,976,991, Cl. 427-125.000.

Amoco Corporation: *See*—
Gardner, Hugh C.; and Newman-Evans, Richard H., 4,977,215, Cl. 525-119.000.
Gardner, Hugh C.; and Newman-Evans, Richard H., 4,977,218, Cl. 525-329.300.
Richards, Robert L., 4,976,444, Cl. 277-53.000.
Salensky, George A.; and Thoman, Thomas S., 4,976,813, Cl. 156-230.000.

AMP Incorporated: *See*—
Fedder, James L., 4,976,628, Cl. 439-101.000.
Green, Eric T.; and Scholz, James P., 4,976,634, Cl. 439-589.000.
Shaffer, Howard Richard, 4,976,132, Cl. 72-416.000.

Amphenol Corporation: *See*—
Riches, Arthur J.; and Andrews, Derek, 4,976,632, Cl. 439-580.000.
Schuder, Bernd; and Reichardt, Manfred, 4,976,630, Cl. 439-260.000.

Amrus Corporation: *See*—
Shpigel, Vladimir, 4,976,468, Cl. 239-587.000.

AMSTED Industries Incorporated: *See*—
Altherr, Russell G., 4,976,363, Cl. 213-155.000.
Kaufhold, Horst T., 4,976,362, Cl. 213-152.000.

Amstutz, Rene ; Bolliger, Georg; and Shapiro, Gideon, to Sandoz Ltd. Pilocarpine compounds which are used as pharmaceutical agents. 4,977,176, Cl. 514-397.000.

Amundson, W. Duane, Jr.; Boek, Heather; Hares, George B.; and Pfitzenmaier, Robert W., to Corning Incorporated. Beige-tinted glass-ceramics. 4,977,110, Cl. 501-7.000.

Anadrill, Inc.: *See*—
Casso, Christopher G.; Normore, Andrew D.; and Slagel, Peter S., 4,976,143, Cl. 73-151.500.

Analyte Corporation: *See*—
Scuitto, Theodore J.; Scuitto, Thomas J.; and Bernhard, Al E., 4,976,541, Cl. 356-300.000.

Anami, Kenji; and Ichinose, Katsuki, to Mitsubishi Denki Kabushiki Kaisha. Semiconductor memory device having hierarchical row selecting lines. 4,977,538, Cl. 365-230.030.

Anand, Vidhu; Houck, David L.; and Smouse, Dennis C., to GTE Products Corporation. Process for producing free-flowing chromium oxide powders having a low free chromium content. 4,976,948, Cl. 423-607.000.

Andersen Corporation: *See*—
Plummer, David D.; and Ginnow-Merkert, Hartmut, 4,976,066, Cl. 49-225.000.

Anderson, James E.; Markovac, Vlado; and Troyk, Philip R., to Ford Motor Company. Composite polymer/desiccant coatings for IC encapsulation. 4,977,009, Cl. 429-76.000.

Anderson, Kent. Apparatus and method for treating temporomadibular joint dysfunction and bruxism. 4,976,618, Cl. 433-215.000.

Anderson, Kevin B.; and Sebhatu, Endalkachew. Fluid level measuring stick cleaning device (dip-squeeze). 4,975,998, Cl. 15-210.00B.

Andersson, Sven, to AB Volvo. Range gearbox for motor vehicles. 4,976,671, Cl. 475-299.000.

Ando, Hiromitsu: *See*—
Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, 4,976,241, Cl. 123-425.000.

Ando, Katsuhiko: *See*—
Tanaka, Kouji; Kondo, Syugo; Imura, Takeshi; Ando, Katsuhiko; and Nakabayashi, Shigemitsu, 4,976,305, Cl. 164-458.000.

Ando, Kazuhiko: *See*—
Ogawa, Akio; Shimada, Masahiko; and Ando, Kazuhiko, 4,977,201, Cl. 523-400.000.

Ando, Shigehito: *See*—
Akutsu, Eiichi; Soga, Hiroh; and Ando, Shigehito, 4,976,986, Cl. 427-27.000.
Andreas Stihl: *See*—
Schierling, Roland; Wissmann, Michael; Nickel, Hans; and Geyer, Werner, 4,976,246, Cl. 123-509.000.
Andrews, Derek: *See*—
Riches, Arthur J.; and Andrews, Derek, 4,976,632, Cl. 439-580.000.
Andrews, E. Trent; and Moore, Robert R., to Serad, Inc. Syringe needle guard. 4,976,702, Cl. 604-198.000.
Andrews, Harold G., to Genrad, Inc. Apparatus and method for circuit board testing. 4,977,370, Cl. 324-158.00F.
Andus Corporation: *See*—
Ritchie, Ian T.; and Kittler, Wilfred C., 4,977,013, Cl. 428-212.000.
Antebi, Salomone: *See*—
Herzlinger, Andrei; Shorr, Leonard M.; Antebi, Salomone; Morel-Fisher, Theodor; Utevskii, Lev; and Scheinert, Yaakov, 4,977,262, Cl. 544-221.000.
Anthony, Vivienne M.; Clough, John M.; and Godfrey, Christopher R. A., to Imperial Chemical Industries PLC. Thianthrenes and phenoxathiins useful as fungicides. 4,976,771, Cl. 71-90.000.
Anttonen, Kauko K., to Tamglass Oy. Method and apparatus for bending and tempering a glass sheet. 4,976,762, Cl. 65-107.000.
Antunez, Simon: *See*—
Rivas, Olegario; Newski, Alejandro; and Antunez, Simon, 4,976,591, Cl. 417-254.000.
Aoki, Masaru: *See*—
Tsujimoto, Yasuhiro; Kurita, Masayuki; and Aoki, Masaru, 4,976,473, Cl. 242-67.10R.
Aonuma, Masashi; Okita, Tsutomu; Hashimoto, Hiroshi; and Kobayashi, Kingo, to Fuji Photo Film Co., Ltd. Method for preparing a magnetic recording medium. 4,976,989, Cl. 427-48.000.
Aorca S.A.: *See*—
Diaz, Victor B.; Domanico, Ricardo H.; and Fussi, Fernando, 4,977,250, Cl. 536-21.000.
Aoyagi, Sakae; Hayashi, Takaaki; and Kuramoto, Yasuhiro, to Lederle (Japan), Ltd. Method of eliminating protective groups. 4,977,256, Cl. 540-227.000.
Apollo Hair Systems, Inc.: *See*—
Wieneke, James E., 4,976,621, Cl. 434-94.000.
APV Baker Pty Ltd.: *See*—
Willett, Paul E., 4,976,600, Cl. 425-151.000.
APV Pasilac A/S: *See*—
Skovhage, Erik; Jorgensen, Eskil B.; Nielsen, Per G.; and Sorensen, Christian B., 4,976,981, Cl. 426-512.000.
Aragonesa de Componentes Pasivos, S.A.: *See*—
Molia, Emelio C., 4,977,387, Cl. 338-174.000.
Arai, Akira: *See*—
Tanaka, Naoyuki; Nakamura, Yozo; Arai, Akira; Nakamura, Mitsuru; Endo, Tsunehiro; and Kadomukai, Yuzo, 4,977,508, Cl. 364-431.080.
Arai, Masao: *See*—
Ihama, Mikio; Kume, Yuji; Tamoto, Koji; Takehara, Hiroshi; and Arai, Masao, 4,977,075, Cl. 430-567.000.
Arai, Mitsuhiro; Tsuchiya, Eiichi; and Ikeda, Tetsuo, to Victor Company of Japan, Ltd. Drum assembly in magnetic recording/reproducing apparatus and manufacturing method thereof. 4,977,473, Cl. 360-130.240.
Arakawa, Kazuaki, to Kurimoto, Ltd. Cone crusher. 4,976,470, Cl. 241-37.000.
Arakawa, Satoshi; Nonomura, Masamitu; Ogoda, Makoto; Torii, Shumpeita; and Kohda, Katsuhiro, to Fuji Photo Film Co., Ltd. Radiation image storage panel. 4,977,327, Cl. 250-484.100.
Araki, Isao: *See*—
Nakajima, Makoto; Ohashi, Yoshio; Chuma, Toshio; Hatori, Kazuo; Araki, Isao; Koizumi, Masahiro; Onuki, Jin; Suzuki, Hitoshi; and Okikawa, Susumu, 4,976,393, Cl. 228-111.000.
Araujo, Luis A. G.: *See*—
Hosie, Stanley; and Araujo, Luis A. G., 4,976,458, Cl. 285-24.000.
Arch Development Corporation: *See*—
Pelizzari, Charles A.; and Chen, George T. Y., 4,977,505, Cl. 364-413.190.
Ardac, Inc.: *See*—
Gorgone, Robert L., 4,977,583, Cl. 377-8.000.
Aries Medical, Inc.: *See*—
Magro, Alfred E., 4,976,681, Cl. 600-17.000.
Arima, Hidetoshi; and Hatayama, Satoyuki, to Tokai Kogyo Kabushiki Kaisha. Automobile door seal, and a molding apparatus thereof. 4,976,069, Cl. 49-497.000.
Arimoto, Kazutami: *See*—
Matsuda, Yoshio; Fujishima, Kazuyasu; Ooishi, Tsukasa; Arimoto, Kazutami; and Tsukude, Masaki, 4,977,542, Cl. 365-207.000.
Ariyoshi, Kimio: *See*—
Tsuneki, Hideaki; Ariyoshi, Kimio; Moriya, Atusi; and Ueshima, Michio, 4,977,118, Cl. 502-35.000.
Arizona Board of Regents: *See*—
Tong, Timothy W.; Sathe, Sanjeev B.; and Peck, Robert E., 4,977,111, Cl. 501-95.000.
Armitage Shanks Ltd.: *See*—
Newcombe, Haydn J.; and Lowe, Jeffrey C., 4,976,460, Cl. 236-12.120.
Armstrong World Industries, Inc.: *See*—
Felter, Richard E.; Markley, Dean A.; and Musser, Deborah L., 4,976,890, Cl. 252-511.000.
Arnold, Fred E.; Helminiak, Thaddeus E.; Wiff, Donald R.; Tan, Loon S.; Hwang, Wen F.; and Chuah, Hoe, to United States of America, Air Force. Thermoset rigid rod molecular composite system. 4,977,223, Cl. 525-432.000.
Arnold, Robert W.; and Maggiulli, Cataldo A., to Eastman Kodak Company. Diacylation of pyrazolotriazoles. 4,977,269, Cl. 548-262.400.
Arnold, Werner; and Grundl, Peter, to Diehl GmbH & Co. Method and apparatus for monitoring the condition of charge of a battery connected to an appliance and including counters counted with respect to the time and drain of the battery. 4,977,393, Cl. 340-636.000.
Art Guild, Inc.: *See*—
Zegel, Douglas R.; Jensen, Gary S.; Hernick, Mark R.; and Daniels, Michael J., 4,976,080, Cl. 52-239.000.
Arthur, James D.; Sanderford, H. Britton, Jr.; and Rouquette, Robert E., to Axonn Corporation. Wireless alarm system. 4,977,577, Cl. 375-1.000.
Artus, Kevin J.: *See*—
Dewar, Colin A.; and Artus, Kevin J., 4,977,015, Cl. 428-221.000.
Aruga, Mutsumi; and Nakamichi, Niro, to Kabushiki Kaisha Sankyo Seiki Seisakusho; and Nakamichi Corporation. Tape edge detecting method and device therefor. 4,977,468, Cl. 360-75.000.
Arzamastsev, Filipp G.: *See*—
Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A., 4,976,322, Cl. 175-57.000.
Asada, Haruo: *See*—
Bunpei, Irie; and Asada, Haruo, 4,977,603, Cl. 382-34.000.
Asahi Denka Kogyo K.K.: *See*—
Ogawa, Akio; Shimada, Masahiko; and Ando, Kazuhiko, 4,977,201, Cl. 523-400.000.
Shirakawa, Yoichi; Minowa, Yoshio; Azumi, Takayoshi; and Hisano, Junichi, 4,976,973, Cl. 426-7.000.
Asahi Kogaku Kogyo Kabushiki Kaisha: *See*—
Yamamoto, Masato; Yamanaka, Toshimasa; and Nakajima, Masahiro, 4,977,425, Cl. 354-474.000.
Asahina, Katsushi: *See*—
Ohbayashi, Shigeki; and Asahina, Katsushi, 4,977,337, Cl. 307-446.000.
Asai Germanium Research Institute Co.: *See*—
Kakimoto, Norihiro; Nakamura, Kunie; and Yoshihara, Toru, 4,977,287, Cl. 556-83.000.
Asai, Keiichi; Mochizuki, Chizuko; and Hori, Kazunobu, to Suzuki Motor Company Limited. Motor-vehicle with sliding doors. 4,976,488, Cl. 296-155.000.
Asai, Shin; Akao, Michitoshi; Katoh, Tokunori; Sakakibara, Kenji; Izaki, Takesi; and Morisaki, Hiroshi, to Brother Kogyo Kabushiki Kaisha. Method and apparatus for performing pressure developement with a pair of pressurizing rollers. 4,977,437, Cl. 355-27.000.
Asakura, Masahiko; Shiraiwa, Kimio; Hattori, Yoichi; and Toume, Naotosi, to Kabushiki Kaisha Toshiba. Low-pressure mercury vapor discharge lamp. 4,977,349, Cl. 313-490.000.
Asano, Hiroshi: *See*—
Yoshikawa, Nobuyoshi; and Asano, Hiroshi, 4,976,291, Cl. 138-175.000.
Asberg, Bengt A.: *See*—
Hedlund, Jan-Gunnar; and Asberg, Bengt A., 4,976,496, Cl. 299-81.000.
Ascough, Michael R.; and Bueley, James A., to Dupont Canada Inc. Process for extraction and recovery of blowing agents from polymeric foams. 4,976,862, Cl. 210-656.000.
Asea Brown Boveri Aktiengesellschaft: *See*—
Sachse, Bruno; Weiskopf, Hubert; Engel, Joachim; and Zintel, Jakob, 4,976,914, Cl. 376-391.000.
Asea Brown Boveri Ltd.: *See*—
Mader, Rudolf, 4,977,362, Cl. 318-713.000.
Ashford, Neil F.; Hodgson, Alan; Blum, Peter M.; and Postle, Stephen R., to Ilford Limited. Method of preparing a hologram. 4,977,047, Cl. 430-2.000.
Ashikawa, Noboru; and Yumoto, Toshiyuki, to Honda Giken Kogyo Kabushiki Kaisha. Final reduction gear unit for an automobile. 4,976,668, Cl. 475-221.000.
ASTEC International Limited: *See*—
Smith, David A., 4,977,493, Cl. 363-126.000.
Astle, William H.: *See*—
Vanderpol, Jerald; and Astle, William H., 4,976,176, Cl. 82-113.000.
Astra Vent AB: *See*—
Torok, Vilmos; and Loreth, Andrezej, 4,976,752, Cl. 55-117.000.
AT&E Corporation: *See*—
Price, Gary A.; Park, Daniel J.; and Gehring, Mark R., 4,977,399, Cl. 340-825.440.
AT&T Bell Laboratories: *See*—
Chand, Naresh, 4,977,103, Cl. 437-105.000.
Darsey, Ralph J.; and Hurd, William J., 4,976,596, Cl. 425-117.000.
Nichols, Robert K.; and Zelle, Bruce R., 4,977,582, Cl. 375-118.000.
Atad, Jack, to Travenol Laboratories (Israel) Ltd. Catheter particularly useful for inducing labor and/or for the application of a pharmaceutical substance to the cervix of the uterus. 4,976,692, Cl. 604-101.000.
Atlantic Richfield Company: *See*—
Carpenter, Robert B.; and Wilson, William N., 4,976,316, Cl. 166-291.000.
Dobyns, Loren K.; Hanson, Gary S.; and Shrum, Durel B., 4,976,756, Cl. 55-341.100.
Aumueller, Alexander; Neumann, Peter; and Trauth, Hubert, to BASF Aktiengesellschaft. 4-formylaminopiperidine derivatives, their use as

stabilizers and organic material stabilized with the said derivatives. 4,976,889, Cl. 252-403.000.

Ausimont S.p.A.: *See*—
Bargigia, Gianangelo; Re, Alberto; Corbelli, Luigi; Johns, Ken; Flabbi, Luciano; and Srinivasan, Padmanabhan, 4,977,222, Cl. 525-359.300.

Australux North America Ltd.: *See*—
Spotts, James C.; and Chai, Haw R., 4,977,488, Cl. 362-183.000.

Automated Wafer Systems: *See*—
Adams, Kenneth H., 4,976,612, Cl. 432-239.000.

Automatic Inspection Systems, Inc.: *See*—
Porter, Bryan K.; Jakubiak, Marvin J.; and Bott, Jerry A., 4,976,090, Cl. 53-448.000.

Automatic Switch Company: *See*—
Holborow, Peter; and Kramer, Gary, 4,976,286, Cl. 137-625.430.

Avery, Allison. Portable hair styler. 4,976,276, Cl. 132-212.000.

Awazu, Yasunobu: *See*—
Yoshikawa, Shoichi; Awazu, Yasunobu; and Nishimura, Eiji, 4,977,067, Cl. 430-398.000.

AXA-Entwicklungs- und Maschinenbau- gesellschaft fur produktionstechnische anlagen und Gerate mbH: *See*—
Kappelhof, Heinrich; and Wolf, Gottfried, 4,976,575, Cl. 409-233.000.

Axonn Corporation: *See*—
Arthur, James D.; Sanderford, H. Britton, Jr.; and Rouquette, Robert E., 4,977,577, Cl. 375-1.000.

Axtell, Stephen B. Erasable animated drawing board. 4,976,647, Cl. 446-151.000.

Azumai, Hideo: *See*—
Shimada, Kazuyuki; Niito, Yoshiharu; Kiya, Yikitoshi; Yagishita, Takahiro; Miyamoto, Masayoshi; Azumai, Hideo; and Iwasaki, Keiichi, 4,977,414, Cl. 346-154.000.

Azumi, Takayoshi: *See*—
Shirakawa, Yoichi; Minowa, Yoshio; Azumi, Takayoshi; and Hisano, Junichi, 4,976,973, Cl. 426-7.000.

B & H Manufacturing Company, Inc.: *See*—
Hoffman, Wolfgang, 4,977,002, Cl. 428-34.700.

Baader, Ekkehard: *See*—
Wess, Gunther; Kerseler, Kurt; Baader, Ekkehard; and Beck, Gerhard, 4,977,279, Cl. 549-274.000.

Babashak, John F.: *See*—
Straus, Daniel A.; and Babashak, John F., 4,976,927, Cl. 422-102.000.

Babcock-Hitachi Kabushiki Kaisha: *See*—
Kato, Yasuyoshi; Teshima, Nobue; Ohta, Masao; and Konishi, Kunihiko, 4,977,128, Cl. 502-328.000.

Babcock & Wilcox Company, The: *See*—
Berthold, John W.; and Thompson, Lawrence B., 4,976,157, Cl. 73-861.240.
Brown, Steve K.; Dixon, Larry D.; and Sharrow, Joseph F., 4,976,577, Cl. 411-271.000.

Babico, John Y.; and Petrie, Adelore F., to Motorola, Inc. Short-circuit protected switched output circuit. 4,977,477, Cl. 361-98.000.

Bach, Wolf; Ferrier, Donald R.; Kukanskis, Peter E.; Williams, Ann S.; and Senechal, Mary J., to MacDermid, Incorporated. Process for metallizing non-conductive substrates. 4,976,990, Cl. 427-98.000.

Bacher, Michel; and Bionaz, Jean E., to Valeo. Automobile, and corresponding hydrokinetic coupling apparatus. 4,976,656, Cl. 464-68.000.

Bachmann, Andreas; and Carl, Arnd-Gunther, to Siemens Aktiengesellschaft. Flexible electrical control cable. 4,976,509, Cl. 350-96.230.

Bader, Douglas L.: *See*—
Rudolph, Peter K. C.; and Bader, Douglas L., 4,976,397, Cl. 244-134.00B.

Baer, Austin R. Multi-piece thrust bearing assembly for a hinge structure. 4,976,008, Cl. 16-354.000.

Bagga, Madan M., to Ciba-Geigy Corporation. Curable epoxide resin compositions. 4,977,214, Cl. 525-109.000.

Baggett, Neil: *See*—
Barker, Sidney A.; Baggett, Neil; Stevenson, John; George, Raymond D.; De Courcy, David R.; Hammond, Timothy; and Bradley, Martin, 4,977,209, Cl. 524-594.000.

Bahl, Lalit R.; DeSouza, Peter V.; Mercer, Robert L.; and Picheny, Michael A., to International Business Machines Corporation. Speech recognition employing a set of Markov models that includes Markov models representing transitions to and from silence. 4,977,599, Cl. 381-43.000.

Baker, Don R.; and Brownell, Keith H., to ICI Americas Inc. Fungicidal N-(substituted thio)-pyridyl cyclopropane carboxamides. 4,977,164, Cl. 514-318.000.

Baker Hughes Incorporated: *See*—
Tibbitts, Gordon A., 4,976,324, Cl. 175-329.000.

Baker, James C.: *See*—
Linder, Donald L.; Goode, Steve H.; Kazecki, Henry L.; Dennis, Donald W.; and Baker, James C., 4,977,616, Cl. 455-277.000.

Baker, Joseph R.; Golland, Wesley A.; Mullens, Paul A.; and Trimble, Roger B. Transit vehicle farebox for conducting multi-media transit fare transactions. 4,977,502, Cl. 364-405.000.

Baldi, Alfonso L., to Alloy Surfaces Company, Inc. Coating and compositions. 4,977,036, Cl. 428-553.000.

Baldini, Francesco: *See*—
Falcial, Riccardo; Scheggi, Annamaria V.; Baldini, Francesco; and Bechi, Paolo, 4,976,265, Cl. 128-634.000.

Baldwin, Brian E. Fluid conduit-responsively adjustable pump arrangement and pump/conduit arrangement and method, and fluid conduits therefor. 4,976,590, Cl. 417-53.000.

Baldwin, William S.; Willging, Stephen M.; and Siegel, Brock M., to Henkel Corporation. Production of d-alpha-tocopherol from natural plant sources. 4,977,282, Cl. 549-412.000.

Ball, Keith V.; Halblander, Karl-Heinz; and Loftus, Barry N., to Schering Agrochemicals Limited. Implant gun. 4,976,686, Cl. 604-61.000.

Ballance, John W., to British Telecommunications plc. Optical communications network. 4,977,593, Cl. 380-2.000.

Bally Engineered Structures, Inc.: *See*—
Litzenberger, Ernest N., 4,976,081, Cl. 52-309.110.

Bando, Thoru: *See*—
Matsuo, Shigeru; Murakami, Tomoyoshi; Bando, Thoru; and Nagatoshi, Kikuo, 4,977,234, Cl. 528-211.000.

Banister, Eric W.: *See*—
Szabo, Louis, deceased; Morariu, Gavril; and Banister, Eric W., 4,976,426, Cl. 272-130.000.

Banks, Rodney H.; and Shah, Jitendra T., to Nalco Chemical Company. Method of monitoring flocculant effectiveness. 4,976,871, Cl. 210-709.000.

Banning, William L.; and Ingles, Harrison D., Jr., to International Business Machines Corp. Method and apparatus for commanding operations on a computer network. 4,977,499, Cl. 364-200.000.

Bar Ilan University: *See*—
Grossman, Shlomo; and Albeck, Michael, 4,976,960, Cl. 424-195.100.

Baradel, Agostino; Della Penna, Gino; Gulinelli, Silvio; Valdiserri, Mario; and Robertiello, Andrea, to Eniricerche S.p.A. Treatment of the effluents from the production of epoxy resins. 4,976,864, Cl. 210-610.000.

Baran, John S.: *See*—
Hanson, Gunnar J.; and Baran, John S., 4,977,141, Cl. 514-19.000.

Barclay, Randel L. Annular scrap segments in tire reduction. 4,976,178, Cl. 83-19.000.

Bard, Martin, to Buchtal Gesellschaft mit beschrankter Haftung. Natural stone plate having holding elements provided on the side facing away from the visible side. 4,976,082, Cl. 52-384.000.

Barder, Timothy J.; Bedwell, W. Brian; and Johnson, Steven P., to UOP. Separation of sterols from low-acid feeds with magnesium silicate and methyl-tert-butyl ether desorbent. 4,977,243, Cl. 530-208.000.

Bardo, Charles J., to Ceramic Cooling Tower Company. Lightweight cooling tower with fan supported by a vertical liquid supply pipe. 4,976,895, Cl. 261-108.000.

Bargigia, Gianangelo; Re, Alberto; Corbelli, Luigi; Johns, Ken; Flabbi, Luciano; and Srinivasan, Padmanabhan, to Ausimont S.p.A. Cross-linking of thermosetting resins by means of heating with saturated perfluoropolyether vapor in the presence of a secondary fluid. 4,977,222, Cl. 525-359.300.

Barker, Sidney A.; Baggett, Neil; Stevenson, John; George, Raymond D.; De Courcy, David R.; Hammond, Timothy; and Bradley, Martin, to Foseco International Limited. Production of articles of bonded particulate material and binder compositions for use therein from phenol-formaldehyde and oxyanion. 4,977,209, Cl. 524-594.000.

Barmettler, Peter. Hammock with frame. 4,975,994, Cl. 5-120.000.

Barnes, Gordon B., Jr. Exercise apparatus featuring torsional twisting motion in a stationary exercise device. 4,976,425, Cl. 272-128.000.

Barnes, Keith D.; Hotzman, Frederick W.; Limpel, Lawrence E.; and Magee, Thomas A., to Fermenta ASC Corporation. Herbicidal and plant growth regulant activity of glyoxylates. 4,976,770, Cl. 71-88.000.

Barnett, Donald B.: *See*—
McAndless, John M.; Hancock, James R.; Barnett, Donald B.; Olm, Orville J.; Locke, Terry J. A.; and Maybank, John, 4,976,924, Cl. 422-99.000.

Baroid Technology, Inc.: *See*—
Perales, Kenneth L., 4,976,142, Cl. 73-155.000.

Bartoes, Robert J.; and Wirth, Eugene A., to Pitney Bowes Inc. Buckle chute folder exit rollers. 4,976,419, Cl. 270-45.000.

BASF Aktiengesellschaft: *See*—
Aumueller, Alexander; Neumann, Peter; and Trauth, Hubert, 4,976,889, Cl. 252-403.000.
Benninghoff, Norbert; Jaensch, Manfred; Melzer, Jaroslav; Niesar, Gunter; and Schuster, Werner, 4,976,138, Cl. 73-73.000.
De Clercq, Arnold; Bergold, Wolfram; Degen, Hans-Juergen; and Melzer, Jaroslav, 4,976,888, Cl. 252-358.000.
Dix, Johannes P.; Hansen, Guenter; and Kast, Hellmut, 4,976,744, Cl. 8-527.000.
Kerth, Juergen; Werner, Rainer A.; Zolk, Ralf; Ruempler, Klaus-Dieter; Schweier, Guenther; Mueller-Mall, Rudolf; and Gruber, Wolfgang, 4,977,210, Cl. 525-53.000.
Meyer, Joachim; Buehler, Wolfgang; Grimmer, Johannes; Eipper, Gunter; Kiefer, Hans; and Martin, Christoph, 4,977,190, Cl. 514-951.000.
Schmeidl, Karl, 4,977,278, Cl. 549-227.000.

BASF Corporation: *See*—
Davis, John S., 4,976,823, Cl. 202-158.000.

Batchelder, Tom W.; Sautter, Kenneth M.; and Memovich, Gary H. In-line photoresist thickness monitor. 4,977,330, Cl. 250-560.000.

Bateman, Ray E., to United States of America, Navy. Test set for a navigational satellite receiver. 4,977,579, Cl. 375-10.000.

Batson, Jack. Apparatus for restraining the movement of wheeled carts. 4,976,447, Cl. 280-33.994.

Battaglia, Anthony D., to Chiquita Brands, Inc. Hand implement for picking citrus fruit and the like. 4,976,032, Cl. 30-298.000.

Battelle Development Corporation: *See*—
Maringer, Robert E.; Nack, Herman; and Razgaitis, Richard, 4,976,934, Cl. 423-210.000.

Battelle-Institut e.V.: *See*—
Ammende, Sonya; Erdmann, Hartmut; Etzkorn, Heinz-Werner; and Zucholl, Klaus, 4,976,991, Cl. 427-125.000.

Battery Technologies Inc.: *See*—
Kordesch, Karl; and Ujj, Ronald, 4,977,364, Cl. 320-21.000.

Bauer, Gerhard; and Rodel, Reinhard, to Frenzelit-Werke GmbH & Co. KG. Asbestos-free material for use as sealing, damping and/or separating element. 4,977,205, Cl. 524-496.000.

Baumer Electric AG: *See*—
Scheck, Werner; Idler, Siegfried; and Furrer, Bernard, 4,976,543, Cl. 356-375.000.

Bavaro, Joseph P.; and Nigh, Frank M., to Bavco Manufacturing Company, Inc. Emergency lighting system. 4,977,351, Cl. 315-87.000.

Bavco Manufacturing Company, Inc.: *See*—
Bavaro, Joseph P.; and Nigh, Frank M., 4,977,351, Cl. 315-87.000.

Baxenden Chemical Co., The: *See*—
Hughes, Anthony H.; and Topham, Arthur, 4,976,837, Cl. 204-181.700.

Baxter, Gene F.: *See*—
McVay, Ted M.; and Baxter, Gene F., 4,977,231, Cl. 528-142.000.

Bay, Peter M.; Colaluca, Carmine J., Jr.; and Pataki, Steven, to Fairchild Space and Defense Corporation. Spacecraft connector. 4,976,399, Cl. 244-161.000.

Bayer Aktiengesellschaft: *See*—
Haas, Peter; and Hettel, Hans, 4,977,194, Cl. 521-99.000.
Schlossmann, Klas; Zembrod, Alfred; Kazda, Stanislav; Serno, Peter; and Klinksiek, Bernd, 4,976,964, Cl. 424-450.000.
Schriewer, Michael; Croche, Klaus; Zeiler, Hans-Jonchim; and Hetzner, Karl G., 4,977,263, Cl. 544-329.000.
Webwer, Theodor A.; and Kummer, Wolfgang, 4,976,779, Cl. 75-363.000.
Wollweber, Detlef; Brandes, Wilhelm; and Dutzmann, Stefan, 4,977,182, Cl. 514-423.000.

Baylor College of Medicine: *See*—
Nichols, Buford L.; and McKee, Kathryn S., 4,977,137, Cl. 514-6.000.

Bays, F. Barry; Trott, Arthur F.; and Marchand, Sam R., to Concept, Inc. Repair tack for bodily tissue. 4,976,715, Cl. 606-77.000.

Bazin, Roland M.; Obadia, Gerard; Marcotte, Louis; and Scot, Jean, to L'Oreal. Method and device for measuring the elasticity of a superficial layer, in particular of the skin. 4,976,272, Cl. 128-774.000.

BBC Brown, Boveri Ltd.: *See*—
Abbas, Christiaan, 4,977,438, Cl. 357-38.000.

BC Research and Development, Inc.: *See*—
Beran, Mark A.; and Evans, Allan J., 4,976,065, Cl. 49-43.000.

Beal, Thomas J.; Karabin, Tadeusz; and Mundy, Roy E., to Majco Building Specialties, L.P. Method and apparatus for burning gas in the combustion chamber of a fireplace. 4,976,253, Cl. 126-512.000.

Beato, Louis J., to Eastman Kodak Company. Character normalization using an elliptical sampling window for optical character recognition. 4,977,602, Cl. 382-27.000.

Beattie, Lewis J. Two component fluid mixing and dispensing system. 4,976,546, Cl. 366-162.000.

Beatty, Robert. Sine plate adjustable tension clamp. 4,976,042, Cl. 33-536.000.

Beaver, Edward: *See*—
Johnson, Mark S.; Beaver, Edward; Jovanovic, Manojlo; and Chavez, Domingo, 4,976,977, Cl. 426-96.000.

Bechi, Paolo: *See*—
Falcial, Riccardo; Scheggi, Annamaria V.; Baldini, Francesco; and Bechi, Paolo, 4,976,265, Cl. 128-634.000.

Beck, Carl W.: *See*—
Mahaney, Bernard F., Jr.; Beck, Carl W.; Nixon, Kim B.; Connolly, Randolph; and Nunemaker, Terry V., 4,976,576, Cl. 411-121.000.

Beck, Gerhard: *See*—
Wess, Gunther; Kesseler, Kurt; Baader, Ekkehard; and Beck, Gerhard, 4,977,279, Cl. 549-274.000.

Beck, Henry N.; and Mahoney, Robert D., to Dow Chemical Company, The. Microporous membranes from isotactic polystyrene and syndiotactic polystyrene. 4,976,901, Cl. 264-45.900.

Beck, Richard W.: *See*—
Walder, Anthony J.; Solomon, Donald D.; Beck, Richard W.; Lambert, James M.; Ignatius, Timothy; and Crawford, Mark, 4,976,697, Cl. 604-164.000.

Becker, Charlton D.: *See*—
Eisner, Mark R.; and Becker, Charlton D., 4,976,616, Cl. 433-77.000.

Becker, Rudolf, to Liebherr-Werk Ehingen GmbH. Mobile crane comprising a telescopic boom. 4,976,361, Cl. 212-231.000.

Becker, Wolfgang: *See*—
Uphues, Guenter; Ploog, Uwe; Becker, Wolfgang; and Goebel, Irmhild, 4,977,294, Cl. 558-208.000.

Becton, Dickinson and Company: *See*—
Sanderson, George; and Strowe, Robert J., 4,976,696, Cl. 604-154.000.
Stoermer, Ralph T., III; and Darner, James C., 4,976,931, Cl. 422-211.000.
Walder, Anthony J.; Solomon, Donald D.; Beck, Richard W.; Lambert, James M.; Ignatius, Timothy; and Crawford, Mark, 4,976,697, Cl. 604-164.000.

Bedi, Ram D.; and van der Griendt, Andrianus J., to K.J. Manufacturing. Quick connect coupling adapters for facilitating simple and high speed oil change in an internal combustion engine. 4,976,233, Cl. 123-196.00R.

Bedwell, W. Brian: *See*—
Barder, Timothy J.; Bedwell, W. Brian; and Johnson, Steven P., 4,977,243, Cl. 530-208.000.

Beebe, James C.: *See*—
Cargould, Barry D.; and Beebe, James C., 4,976,141, Cl. 73-146.000.

Beghelli, Gian P., to G. P. B. Beghelli S.r.l. Improvement in quick end connection systems for lamps especially lamp with a weatherproof housing. 4,976,633, Cl. 439-571.000.

Bendix France: *See*—
Le Marchand, Claude, 4,976,339, Cl. 188-73.450.

Benge, Herman: *See*—
Parl, Fritz F.; Bradley, Charles A.; Benge, Herman; and Black, David L., 4,976,270, Cl. 128-760.000.

Benninger AG: *See*—
Bollen, Manfred, 4,976,018, Cl. 28-187.000.

Benninghoff, Norbert; Jaensch, Manfred; Melzer, Jaroslav; Niesar, Gunter; and Schuster, Werner, to BASF Aktiengesellschaft. Measuring arrangement for determining the liquid absorption of paper. 4,976,138, Cl. 73-73.000.

Benson, David A.; Bickes, Robert W., Jr.; and Blewer, Robert S., to United States of America, Energy. Tungsten bridge for the low energy ignition of explosive and energetic materials. 4,976,200, Cl. 102-202.700.

Benson, Lewis B.: *See*—
Lee, Yungli J.; Benson, Lewis B.; and College, John W., 4,976,937, Cl. 423-242.000.
Rathi, Ronald J.; and Benson, Lewis B., 4,976,936, Cl. 423-242.000.

Beran, Mark A.; and Evans, Allan J., to BC Research and Development, Inc. Control apparatus for doors. 4,976,065, Cl. 49-43.000.

Berard, Anthony S. Method of playing a board game of strategy and conquest. 4,976,437, Cl. 273-261.000.

Berg, Thomas E., to Hewlett-Packard Company. Write and erase magnetic bias field switching system for a magneto-optic disk drive. 4,977,549, Cl. 369-13.000.

Berger, Henry, Jr.; and Frangakis, Crist J., to Burroughs Wellcome Co. T-PA and SOD in limiting tissue damage. 4,976,959, Cl. 424-94.200.

Bergervoet, Jozef R. M.; and Konings, Leonardus U. E., to U.S. Philips Corporation. Electrodeless low-pressure discharge lamp. 4,977,354, Cl. 315-248.000.

Berglund, Wilhelm A. Safety valve assembly for fluid system. 4,976,281, Cl. 137-460.000.

Bergold, Wolfram: *See*—
De Clercq, Arnold; Bergold, Wolfram; Degen, Hans-Juergen; and Melzer, Jaroslav, 4,976,888, Cl. 252-358.000.

Berlin, Kenneth D.; Ford, Warren T.; Rajadhyaksha, Shirish N.; Gale, Jonathan B.; and Spruce, Lyle W., to Oklahoma Agricultural and Mechanical Colleges acting for and on behalf of Oklahoma State Univ., The Board of Regents for the. Heteroarotinoids as anticancer agents. 4,977,276, Cl. 549-58.000.

Bernardi, Adriano: *See*—
Nuzzolo, Carlo A.; Bernardi, Adriano; Pessi, Antonello; and Verdini, Antonio S., 4,977,079, Cl. 435-7.000.

Bernat, Andre ; Delabassee, Denis; Frehel, Daniel; Maffrand, Jean-Pierre; and Vallee, Eric, to Sanofi. Derivatives of the N α-arylsulphonylaminoacyl-p-amidinophenyl-alaninamides, and their use as medicaments. 4,977,168, Cl. 514-330.000.

Bernhard, Al E.: *See*—
Scuitto, Theodore J.; Scuitto, Thomas J.; and Bernhard, Al E., 4,976,541, Cl. 356-300.000.

Bernstrom, Marvin L., to Eaton Corporation. Gerotor motor and improved pressure balancing therefor. 4,976,594, Cl. 418-61.300.

Berol Kemi AB: *See*—
Skold, Rolf; and Johansson, Irene, 4,976,919, Cl. 422-7.000.

Berrebi, Georges; and Dufresne, Pierre, to Europeenne de Retraitement de Catalyseurs. Process of presulfurizing and controlling the activity of catalyst for treating hydrocarbons. 4,977,117, Cl. 502-26.000.

Berry, David F.; Klar, Erhard; and Svilar, Mark, to SCM Metal Products, Inc. Infiltrated powder metal part and method for making same. 4,976,778, Cl. 75-254.000.

Berry, Harry E. Coaster brake bicycle and changeable speed gear attachment therefore. 4,976,348, Cl. 192-6.00A.

Berthold, John W.; and Thompson, Lawrence B., to Babcock & Wilcox Company, The. Fiber optic flow sensor. 4,976,157, Cl. 73-861.240.

Berthold, Richard: *See*—
Louis, William J.; Berthold, Richard; Seiler, Max-Peter; and Stoll, Andre, 4,977,153, Cl. 514-237.500.

Bertin & Cie: *See*—
Fardeau, Michel G. J.; and Adamolle, Bruno J. M., 4,977,605, Cl. 382-51.000.

Besnard, Serge. Process and apparatus for automatic surveillance of a site. 4,977,451, Cl. 358-108.000.

Bessyo, Daisuke: *See*—
Maehara, Naoyoshi; Bessyo, Daisuke; Matsumoto, Takahiro; and Kusunoki, Shigeru, 4,977,301, Cl. 219-10.55B.

Bethlehem Steel Corporation: *See*—
Deka, Mitrajyoti, 4,976,150, Cl. 73-644.000.

Bettle, Griscom, III; and Gargano, Christopher W., to Tropicana Products, Inc. Barrier structure for food packages. 4,977,004, Cl. 428-36.700.

Betty Sting Patient Gowns, Inc.: *See*—
Sting, Betty J., 4,975,984, Cl. 2-114.000.

Beukes, Christo A.; Patz, Vivian E.; and Moraitis, Thrasyvoulas, to Expert Explosives (Proprietary) Limited. Blasting system and its method of control. 4,976,199, Cl. 102-200.000.

BHS-Bayerische Berg-, Hutten- und Salzwerke Aktiengesellschaft: *See*—
Mensing, Hermann; Sternitzke, Reinhard; Waldeck, Karl; and Schnabel, Klaus, 4,976,676, Cl. 493-365.000.

Bianchi, Dennis R. Simulated neon sign. 4,976,057, Cl. 40-579.000.

Bibl, Andreas; and Fellingham, George, to Rastergraphics, Inc. Integrated thick film electrostatic writing head. 4,977,416, Cl. 346-155.000.

BICC plc: *See*—
Davey, Rodney J.; and Sadler, Alan A., 4,976,519, Cl. 350-96.230.

Bichon, Daniel; and Lamy, Bernard. Biodegradable polypeptide and the use thereof for the gradual release of drugs. 4,976,962, Cl. 424-424.000.

Bickelman, Harry M. Sterile disposable cover for a cylindrical handle. 4,976,299, Cl. 150-155.000.

Bickes, Robert W., Jr.: *See*—
Benson, David A.; Bickes, Robert W., Jr.; and Blewer, Robert S., 4,976,200, Cl. 102-202.700.

Bicron Corporation: *See*—
Johnston, Joseph G., 4,977,367, Cl. 324-115.000.

Bicz, Wieslaw, to Pritzl, Werner; and Wegener, Bernd. Method of recognizing a fingerprint. 4,977,601, Cl. 382-4.000.

Biddle, Richard A.; and Willer, Rodney L., to Morton Thiokol Inc. Thermoplastic elastomer-based low vulnerability ammunition gun propellants. 4,976,794, Cl. 149-19.500.

Bieber, David; and Carpenter, Lester E., to American Tourister, Inc. File folder for attache case. 4,976,340, Cl. 190-109.000.

Bieg, Lothar F., to United States of America, Energy. Precision contour gage. 4,976,043, Cl. 33-551.000.

Biftu, Tesfaye; Ponpipom, Mitree M.; and Girotra, Nirindar N., to Merck & Co., Inc. 2,5-diaryl tetrahydrofurans and analogs thereof as PAF antagonists. 4,977,146, Cl. 514-99.000.

Bigg, Dennis: *See*—
Sevrin, Mireille; George, Pascal; Menin, Jacques; Morel, Claude; and Bigg, Dennis, 4,977,159, Cl. 514-292.000.

Biles, Kenneth A.: *See*—
Oliver, James D., Jr.; Biles, Kenneth A.; and Kasemset, Dumrong, 4,977,371, Cl. 324-158.00T.

Bilhorn, John M., to Energy Research Corporation. Method and apparatus for continuous formation of fibrillated polymer binder electrode component. 4,976,904, Cl. 264-104.000.

Bindi, Rudi: *See*—
Akin, Timothy W.; and Bindi, Rudi, 4,976,257, Cl. 128-78.000.

Binstock, Morton H.; and Shaltes, Walter B., to Westinghouse Electric Corp. Turbine efficient valve position computer. 4,976,108, Cl. 60-660.000.

Biomedical Design, Inc.: *See*—
Girardot, Jean-Marie, 4,976,733, Cl. 623-11.000.

Bionaz, Jean E.: *See*—
Bacher, Michel; and Bionaz, Jean E., 4,976,656, Cl. 464-68.000.

Bioprobe International: *See*—
Ngo, That T.; and Wong, Raphael C., 4,977,077, Cl. 435-7.000.

Birger, Ari, to Motorola, Inc. Method of computation of normalized numbers. 4,977,535, Cl. 364-748.000.

Birnberg, Gary H.: *See*—
Tomcufcik, Andrew S.; Dixon, James S.; Epstein, Joseph W.; Birnberg, Gary H.; and Fanshawe, William J., 4,977,189, Cl. 514-603.000.

Biscans, Beatrice: *See*—
Sanchez, Victor; Biscans, Beatrice; Couderc, Jean-Pierre; and Riba, Jean-Pierre, 4,976,865, Cl. 210-635.000.

Biswass, Jaydeep: *See*—
Maxwell, Ian E.; and Biswass, Jaydeep, 4,976,847, Cl. 208-120.000.

Bittenson, Steven N.; and Klauminzer, Gary K., to Questek, Inc. Excimer laser output control device. 4,977,573, Cl. 372-81.000.

Bitter, Grant A., to Amgen. Expression of exogenous polypeptides and polypeptide products including hepatitis B surface antigen in yeast cells. 4,977,092, Cl. 435-320.000.

Bittler, Dieter: *See*—
Jungblut, Peter; Wiechert, Rudolf; and Bittler, Dieter, 4,977,147, Cl. 514-171.000.

Biziere, Kathleen; Wermuth, Camille G.; Worms, Paul; and Bourguignon, Jean-Jacques, to Societe Anonyme: Sanofi. Novel tricyclic derivatives which are agonists of cholinergic receptors, and drugs in which they are present. 4,977,152, Cl. 514-232.800.

Bjorkqvist, Markku R., to AB Varnamo Gummifabrik. Knock down spool. 4,976,475, Cl. 242-115.000.

Black, Caron J.: *See*—
Black, David; Black, Caron J.; and Williams, Daniel E., 4,975,993, Cl. 4-601.000.

Black, David; Black, Caron J.; and Williams, Daniel E. Dual-headed shower device. 4,975,993, Cl. 4-601.000.

Black, David L.: *See*—
Parl, Fritz F.; Bradley, Charles A.; Benge, Herman; and Black, David L., 4,976,270, Cl. 128-760.000.

Black & Decker Inc.: *See*—
Lentino, Lynn E., 4,976,164, Cl. 74-50.000.

Blackman, William C., to Cooper Industries, Inc. Tape measure lock. 4,976,048, Cl. 33-767.000.

Blackmore, Richard D.: *See*—
Gelin, Robert J.; and Blackmore, Richard D., 4,976,290, Cl. 138-141.000.

Blackwell, Andrew K., to Delco Electronics Corporation. Highly efficient method and apparatus for calculating rotational speed. 4,977,525, Cl. 364-565.000.

Blair, Lindley: *See*—
Sprague, George; Herskowitz, Ira; Thorner, Jeremy; Julius, David; Blair, Lindley; and Brake, Anthony, 4,977,085, Cl. 435-212.000.

Blair, Paul A. Blood drawing system. 4,976,271, Cl. 128-764.000.

Bland, Gerald F.; Mondek, Martin J.; and Zdanowicz, Lawrence E., to Outboard Marine Corporation. Marine propulsion device with elastomeric cushion. 4,976,640, Cl. 440-61.000.

Blasnik, William; and Pollak, Stanley B., to Research Foundation of State University of New York, The. Surgical clamping device. 4,976,721, Cl. 606-157.000.

Bleszinski, Walter, Jr.; and Bruder, Alan H., to Polaroid Corporation. Lithium batteries. 4,977,046, Cl. 429-194.000.

Blewer, Robert S.: *See*—
Benson, David A.; Bickes, Robert W., Jr.; and Blewer, Robert S., 4,976,200, Cl. 102-202.700.

Block, Frank E., Jr. Method of blood-gas interface control in surgical gas traps. 4,976,685, Cl. 604-52.000.

Block, Juergen; Feicho, Lutz; Sobe, Alwin; and Wischniewski, Martin, to Kali-Chemie Pharma GmbH. Coronary affecting medicinal composition. 4,976,965, Cl. 424-456.000.

Blum, Peter M.: *See*—
Ashford, Neil F.; Hodgson, Alan; Blum, Peter M.; and Postle, Stephen R., 4,977,047, Cl. 430-2.000.

Blumenshine, Kent M.; Marcus, Harris L.; and Long-Daugherty, Kathleen A., to Motorola, Inc. Method of making a ceramic semiconductor package having crack arrestor patterns. 4,976,814, Cl. 156-277.000.

Board of Governors for Higher Education, State of Rhode Island and Providence Plantations, The: *See*—
Vittimberga, Bruno M., 4,976,774, Cl. 71-94.000.

Board of Regents, The University of Texas System: *See*—
Jones, C. Michael, 4,977,245, Cl. 530-35.000.

Board of Trustees operating Michigan State University: *See*—
Nair, Muraleedharan G., 4,977,084, Cl. 435-78.000.

Boateng, Daniel A. D., to Cominco Ltd. Method for making arsenic acid. 4,976,832, Cl. 204-98.000.

BOC Group, Inc., The: *See*—
Garrett, Michael E., 4,976,109, Cl. 62-18.000.

Bodicky, Raymond O.; and Ranford, Alan B., to Sherwood Medical Company. Fluid collection, storage and infusion apparatus. 4,976,707, Cl. 604-408.000.

Boeck, LaVerne D., to Eli Lilly and Company. Processes for preparing A54145 compounds. 4,977,083, Cl. 435-71.300.

Boeing Company, The: *See*—
Carlson, Robert B.; Cosgrove, Barbara J.; and Meredith, Paul T., 4,976,396, Cl. 244-55.000.
Mahaney, Bernard F., Jr.; Beck, Carl W.; Nixon, Kim B.; Connolly, Randolph; and Nunemaker, Terry V., 4,976,576, Cl. 411-121.000.
Rudolph, Peter K. C.; and Bader, Douglas L., 4,976,397, Cl. 244-134.00B.

Boek, Heather: *See*—
Amundson, W. Duane, Jr.; Boek, Heather; Hares, George B.; and Pfitzenmaier, Robert W., 4,977,110, Cl. 501-7.000.

Bogoch, Samuel. Process for the production of recognins and their chemoreciprocals. 4,976,957, Cl. 424-88.000.

Bohn, Gerhard, to Messerschmitt-Bolkow-Blohm GmbH. Suspension device for vehicles. 4,976,454, Cl. 280-707.000.

Boivin, Richard F.; Huni, Jean-Paul R.; and LeBlanc, Robert, to Alcan International Limited. Busbar arrangement for aluminum electrolytic cells. 4,976,841, Cl. 204-243.00M.

Boldyrev, Vladimir V.: *See*—
Kozlov, Vladimir I.; Redkin, Vladimir F.; Kozyrev, Sergei A.; Borisov, Vasily N.; Boldyrev, Vladimir V.; Krebel, Fedor R.; and Rubtsov, Nikolai M., 4,976,472, Cl. 241-172.000.

Bollen, Manfred, to Benninger AG. Device for monitoring threads on a textile machine. 4,976,018, Cl. 28-187.000.

Bolliger, Georg: *See*—
Amstutz, Rene ; Bolliger, Georg; and Shapiro, Gideon, 4,977,176, Cl. 514-397.000.

Bollinger, Steven R., to Carter Automotive Company. Engine air intake valve. 4,976,237, Cl. 123-339.000.

Bom, Petrus L. J., to P.L.J. Bom Beheer B.V. Method and device for building a greenhouse. 4,976,086, Cl. 52-741.000.

Bombardier, Inc.: *See*—
Brooks, Gary E., 4,976,334, Cl. 181-207.000.

Bommer, Jerry C.; and Burnham, Bruce F., to Nippon Petrochemicals Company, Ltd. Tetrapyrrole polyaminomonocarboxylic acid therapeutic agents. 4,977,177, Cl. 514-410.000.

Bond, Gary M.: *See*—
Shaw, Bon F.; Bond, Gary M.; and Fields, Randy R., 4,977,527, Cl. 364-571.030.

Bonnet, Thierry; and Mathieu, Yves, to U.S. Philips Corporation. Video graphics system equipped with a graphics cursor. 4,977,518, Cl. 364-521.000.

Booz, George W.: *See*—
Thornton, Peter B.; Cone, Stanley H.; and Booz, George W., 4,977,016, Cl. 428-225.000.

Borden, Inc.: *See*—
Gillmore, Stephen R.; and Merritt, Carleton G., 4,976,982, Cl. 426-557.000.
Ray, Michael A., 4,975,981, Cl. 2-10.000.

Borisov, Vasily N.: *See*—
Kozlov, Vladimir I.; Redkin, Vladimir F.; Kozyrev, Sergei A.; Borisov, Vasily N.; Boldyrev, Vladimir V.; Krebel, Fedor R.; and Rubtsov, Nikolai M., 4,976,472, Cl. 241-172.000.

Borkowicz, Neil L.; and Moore, Craig A., to Xycom, Inc. Industrial computer system with removable equipment drawer. 4,977,532, Cl. 364-708.000.

Borton, Dorothy L.: *See*—
Dash, Georgia P.; and Borton, Dorothy L., 4,976,254, Cl. 128-4.000.

Bosi, Gianni, to Verpac, S.p.A. Automatic machine for folding flat pre-creased die-cuts into tubular shape. 4,976,675, Cl. 493-295.000.

Bott, Jerry A.: *See*—
Porter, Bryan K.; Jakubiak, Marvin J.; and Bott, Jerry A., 4,976,090, Cl. 53-448.000.

Bourguignon, Jean-Jacques: *See*—
Biziere, Kathleen; Wermuth, Camille G.; Worms, Paul; and Bourguignon, Jean-Jacques, 4,977,152, Cl. 514-232.800.

Bowen, Mark S.; Fantone, Stephen D.; Miller, Bruce E.; and Thompson, Duane T., to P B Diagnostic Systems, Inc. Optical read system and immunoassay method. 4,977,325, Cl. 250-461.200.

Bowman, Charles D., to United States of America, Energy. Nuclear reactivity control using laser induced polarization. 4,976,911, Cl. 376-221.000.

Boyd, Alfred J. Hair trimming apparatus. 4,976,030, Cl. 30-29.500.

Boyd, Douglas P., to Imatron, Inc. Self shielded computerized tomographic scanner. 4,977,585, Cl. 378-4.000.

Boyle, Gary C. Uterine retractor for an abdominal hysterectomy and method of its use. 4,976,717, Cl. 606-119.000.

Boyle, Michael D. P.; and Reis, Kathleen J., to University of Florida Research Foundation, Inc. Type VI bacterial FC receptors. 4,977,082, Cl. 435-71.100.

Bozeman, Richard J., Jr., to United States of America, National Aeronautics and Space Administration. Vibration analyzer. 4,977,395, Cl. 340-683.000.

BPP Corporation: *See*—
Buckley, Clifford J.; and Pfister, Steven R., 4,976,406, Cl. 280-641.000.

Bradbury, Roy; Gemmell, Peter A.; and Hann, Richard A., to Imperial Chemical Industries PLC. Thermal transfer printing. 4,977,135, Cl. 503-227.000.

Bradley, Charles A.: *See*—
Parl, Fritz F.; Bradley, Charles A.; Benge, Herman; and Black, David L., 4,976,270, Cl. 128-760.000.

Bradley, Martin: *See*—
Barker, Sidney A.; Baggett, Neil; Stevenson, John; George, Raymond D.; De Courcy, David R.; Hammond, Timothy; and Bradley, Martin, 4,977,209, Cl. 524-594.000.

Brady, Daniel F.: *See*—
Decker, James D.; Burch, Wendell D.; Brady, Daniel F.; Hinzman, Gary W.; Kromrey, Edward P.; Sanville, Katherine M.; Southworth, Donald R.; Chace, Mark S.; and Peloquin, Perry M., 4,976,137, Cl. 73-53.000.

Brachler, Georg; Ganser, Benno; and Maurer, Paul-Gerhard, to NUKEM GmbH. Method of introducing ecologically harmful waste into subterranean cavities. 4,976,569, Cl. 405-59.000.

Brake, Anthony: *See*—
Sprague, George; Herskowitz, Ira; Thorner, Jeremy; Julius, David; Blair, Lindley; and Brake, Anthony, 4,977,085, Cl. 435-212.000.

Bramblet, John W., to Rockford Controls Corporation. Valve with metallic bellows valve stem seal. 4,976,403, Cl. 251-214.000.

Brammer, Robert C., Jr.: *See*—
Brammer, Robert C., Sr.; and Brammer, Robert C., Jr., 4,976,455, Cl. 280-762.000.

Brammer, Robert C., Sr.; and Brammer, Robert C., Jr., to Stromberg-Carlson Products, Inc. Handrail. 4,976,455, Cl. 280-762.000.

Brandes, Wilhelm: *See*—
Wollweber, Detlef; Brandes, Wilhelm; and Dutzmann, Stefan, 4,977,182, Cl. 514-423.000.

Brandon, Ronald E. Movable bases for softball and baseball playing fields. 4,976,430, Cl. 273-25.000.

Brandstetter, Robert W.; and Fonneland, Nils J., to Grumman Aerospace Corporation. Common path multichannel optical processor. 4,976,520, Cl. 350-384.000.

Bransky, Jeffrey D.: *See*—
Perdue, Thomas E., Jr.; Bransky, Jeffrey D.; Carvell, William S.; Dettloff, David E.; Ischay, Duane K.; and Oberg, Kenneth H., 4,976,373, Cl. 220-335.000.

Braun Aktiengesellschaft: *See*—
Kelterborn, Heinz; and Schiebelhuth, Heinz, 4,976,194, Cl. 99-328.000.

Braun, Hans: *See*—
Schneider, Georg; and Braun, Hans, 4,976,154, Cl. 73-861.060.

Breindl, Werner, to Ina Walzlager Schaeffler KG. Apparatus for tensioning V-belts, especially for automotive vehicles. 4,976,660, Cl. 474-135.000.

Brennelementlager Gorleben GmbH: *See*—
Madle, Wolfgang; Gawlik, Norbert; and Popp, Franz W., 4,976,912, Cl. 376-249.000.

Breslow, David S.: *See*—
Zucker, Armand S.; Breslow, David S.; and Giebel, Harald, 4,976,360, Cl. 211-186.000.

Brice, William F.: *See*—
Spivey, James R.; Dee, William J.; and Brice, William F., 4,976,562, Cl. 401-123.000.

Brieke, Hans-Gunter: *See*—
Foster, Friedrich; Brieke, Hans-Gunter; and Marsch, Hans-Dieter, 4,976,928, Cl. 422-148.000.

Briffod, Jean, to Charmilles Technologie S.A. Zinc or cadmium coated, surface oxidized electrode wire for EDM cutting of a workpiece; and method for forming such a wire. 4,977,303, Cl. 219-69.120.

Brilliant, Stuart D.: *See*—
Croce, Michael R.; and Brilliant, Stuart D., 4,977,193, Cl. 521-85.000.

British Nuclear Fuels plc: *See*—
Jones, James, 4,976,579, Cl. 414-146.000.

British Telecommunications plc: *See*—
Ballance, John W., 4,977,593, Cl. 380-2.000.
Smith, David W.; Cotter, David; and Wyatt, Richard, 4,977,620, Cl. 455-619.000.

British Telecommunications public limited company: *See*—
Cassidy, Stephen A.; and Yennadhiou, Peter, 4,976,505, Cl. 350-96.150.

Brittelli, David R.; Corless, Peter F.; Gregory, Walter A.; and Park, Chung-Ho, to Du Pont de Nemours, E. I., and Company. Aminomethyl oxooxazolidinyl ethenylbenzene derivatives useful as antibacterial agents. 4,977,173, Cl. 514-376.000.

Broadbent, Eliot K., to North American Philips Corp, Signetics Division. Method of forming an aluminum conductor with highly oriented grain structure. 4,976,809, Cl. 156-643.000.

Broadnax, Cecil H., Jr., to Johnson & Johnson Orthopaedics, Inc. Method of using a bendable trocar. 4,976,684, Cl. 604-51.000.

Brockmanns, Karl-Josef; and Lembeck, Theo, to W. Schlafhorst & Co. Sliver feeding and opening device of an open end spinning machine. 4,976,099, Cl. 57-411.000.

Broderick, Kevin B.: *See*—
Patel, Mansukh M.; Chisari, Paul R.; and Broderick, Kevin B., 4,976,972, Cl. 426-3.000.

Bromine Compounds Limited: *See*—
Herzlinger, Andrei; Shorr, Leonard M.; Antebi, Salomone; Morel-Fisher, Theodor; Utevskii, Lev; and Scheinert, Yaakov, 4,977,262, Cl. 544-221.000.

Brooks, Gary E., to Bombardier, Inc. Noise reducing tool and method. 4,976,334, Cl. 181-207.000.

Brother Kogyo Kabushiki Kaisha: *See*—
Asai, Shin; Akao, Michitoshi; Katoh, Tokunori; Sakakibara, Kenji; Izaki, Takesi; and Morisaki, Hiroshi, 4,977,437, Cl. 355-27.000.
Inagaki, Yasuro, 4,976,559, Cl. 400-691.000.
Kuzuya, Susumu; Shimizu, Seiji; Kato, Mikio; Ishikawa, Yujiro; Sakai, Takashi; and Yuki, Eiji, 4,976,558, Cl. 400-615.200.

Brotz, Gregory R. Pelletizing roll and method. 4,976,907, Cl. 264-140.000.

Brown, Colin R.: *See*—
Martell, William A.; Weiss, Ladislaus; VanJaarsveld, Robert P.; and Brown, Colin R., 4,976,400, Cl. 249-134.000.

Brown, David W.: *See*—
Musket, Ronald G.; Brown, David W.; and Munir, Zuhair A., 4,976,987, Cl. 427-38.000.

Brown, Gordon E. Method and apparatus for making wood product. 4,976,905, Cl. 264-115.000.

Brown, Jacqueline L.; Howe, Stephen E.; and Hultman, Sheryl L., to Corning Incorporated. Tintable coatings for glass ophthalmic lenses. 4,977,029, Cl. 428-429.000.

Brown, Mark J.: *See*—
Holcomb, Don R., Sr.; Brown, Mark J.; and Schumacher, Lawrence R., 4,977,613, Cl. 455-182.000.

Brown, Richard F.: *See*—
Edelstein, Fred; Liandris, Maria; and Brown, Richard F., 4,976,754, Cl. 55-159.000.

Brown, Robert C.; and Lu, Shih-Lai, to Minnesota Mining and Manufacturing Company. Nontacky acrylonitrile/butadiene adhesive tape. 4,977,003, Cl. 428-35.500.

Brown, Ronald E.: *See*—
Yoder, Douglas J.; Brown, Ronald E.; Stevenson, Paul E.; Hornback, Donald L.; and Leisure, Ronald K., 4,977,101, Cl. 437-51.000.

Brown, Ronald L., to Finch Conservatories Limited. Building structure. 4,976,076, Cl. 52-90.000.

Brown, Steve K.; Dixon, Larry D.; and Sharrow, Joseph F., to Babcock & Wilcox Company, The. Locking bolt assembly. 4,976,577, Cl. 411-271.000.

Brown & Williamson Tobacco Corporation: *See*—
Rein, Gary, 4,977,548, Cl. 368-10.000.

Brownell, Keith H.: *See*—
Baker, Don R.; and Brownell, Keith H., 4,977,164, Cl. 514-318.000.

Bruder, Alan H.: *See*—
Bleszinski, Walter, Jr.; and Bruder, Alan H., 4,977,046, Cl. 429-194.000.

Bruhn, Hansdieter, to Erno Raumfahrttechnik GmbH. Fuel tank for aggressive liquid fuels. 4,976,398, Cl. 244-135.00R.

Brunel, Andre , to Robert Bosch GmbH. Fuel injection pump. 4,976,236, Cl. 125-300.000.

Buchan, Cynthia L.: *See*—
Stockel, Elfriede; and Buchan, Cynthia L., 4,976,997, Cl. 427-380.000.

Buchbinder, Maurice; and Solar, Ronald J., to Medtronic Versaflex, Inc. Outer exchange catheter system. 4,976,689, Cl. 604-95.000.

Buchholz, Rainer: *See*—
Tomashauer, Josef; Zodrow, Rudolf; and Buchholz, Rainer, 4,976,803, Cl. 156-297.000.

Buchner, Achim R., to Max-Planck-Institut fur Eisenforschung GmbH. Apparatus for manufacturing rollable sheet from metal melts. 4,976,304, Cl. 164-428.000.

Buchtal Gesellschaft mit beschrankter Haftung: *See*—
Bard, Martin, 4,976,082, Cl. 52-384.000.
Buckley, Clifford J.; and Pfister, Steven R., to BPP Corporation. Utility stand. 4,976,406, Cl. 280-641.000.
Budecker, Ludwig, to Alfred Teves GmbH. Radial piston pump. 4,977,606, Cl. 417-538.000.
Budoff Outdoor Furniture, Inc.: *See*—
Ziegler, Sidney, 4,976,492, Cl. 297-31.000.
Buehler, Wolfgang: *See*—
Meyer, Joachim; Buehler, Wolfgang; Grimmer, Johannes; Eipper, Gunter; Kiefer, Hans; and Martin, Christoph, 4,977,190, Cl. 514-951.000.
Bueley, James A.: *See*—
Ascough, Michael R.; and Bueley, James A., 4,976,862, Cl. 210-656.000.
Bufford-Thacker, Barbara A. Apparatus and method for cleaning hot water heater tanks. 4,976,004, Cl. 15-415.100.
Bunczk, Joseph M. Automatic pistol barrel and recoil compensator. 4,976,184, Cl. 89-14.300.
Bunpei, Irie; and Asada, Haruo, to Kabushiki Kaisha Toshiba. Method and apparatus for a pattern recognition. 4,977,603, Cl. 382-34.000.
Burau, Armin: *See*—
Pleschiutschnigg, Fritz-Peter; Parschat, Lothar; Burau, Armin; Rahmfeld, Werner; Moellers, Gerd; Ehrenberg, Hans-Juergen; and Eberhardt, Hans G., 4,976,306, Cl. 164-476.000.
Burch, Wendell D.: *See*—
Decker, James D.; Burch, Wendell D.; Brady, Daniel F.; Hinzman, Gary W.; Kromrey, Edward P.; Sanville, Katherine M.; Southworth, Donald R.; Chace, Mark S.; and Peloquin, Perry M., 4,976,137, Cl. 73-53.000.
Burgess, Lloyd M.; and Gibson, Charles A., to Union Carbide Chemicals and Plastics Company Inc. Aminoethylethanolamine and ethylenediamine producers composition and method for producing same. 4,977,266, Cl. 544-398.000.
Burgi, Maja: *See*—
Willert, Hans-Georg; and Burgi, Maja, 4,976,728, Cl. 623-22.000.
Burnham, Bruce F.: *See*—
Bommer, Jerry C.; and Burnham, Bruce F., 4,977,177, Cl. 514-410.000.
Burns, William K., to United States of America, Navy. Fiber optic transversal filter/variable delay line. 4,976,518, Cl. 350-96.160.
Burroughs Wellcome Co.: *See*—
Berger, Henry, Jr.; and Frangakis, Crist J., 4,976,959, Cl. 424-94.200.
Kneen, Geoffrey; Jackson, William P.; Islip, Peter J.; and Wates, Peter J., 4,977,188, Cl. 514-575.000.
Busetto, Carlo: *See*—
Greco, Alberto; Busetto, Carlo; Cassar, Luigi; and Neri, Carlo, 4,977,259, Cl. 544-69.000.
Bush, Jerome J., to Hamilton Distributing Company. Feed metering mechanism. 4,976,378, Cl. 222-55.000.
Bush, Kevin M., to Hewlett Packard Company. Overlaid digital waveforms display. 4,977,514, Cl. 364-487.000.
Byler, Jay D.: *See*—
Davis, Jeffrey L.; and Byler, Jay D., 4,976,166, Cl. 74-512.000.
C. Behrens AG: *See*—
Otto, Gerhard, 4,976,180, Cl. 83-133.000.
C. M. Offray & Son, Inc.: *See*—
Mandell, Neil, 4,976,649, Cl. 446-220.000.
Cadzow, Mark: *See*—
Mainwaring, David; and Cadzow, Mark, 4,976,781, Cl. 75-710.000.
Caley, Jeffrey H. Auxiliary equipment attachment adapter. 4,976,053, Cl. 37-231.000.
Callahan, Robert W.; and Reed, Bradley W., to Hoechst Celanese Corporation. Systems and methods for predetermining maximum pressure differentials for microporous hollow fibers employed in liquid-liquid extractions. 4,976,867, Cl. 210-637.000.
Callahan, Robert W.; and Johnson, Richard D., to Hoechst Celanese Corporation. Composite porous membranes and methods of making the same. 4,976,897, Cl. 264-22.000.
Callanain, Tadgh, to Agricultural Genetics Company Limited. Novel microorganism and use thereof in ripening cheese. 4,976,975, Cl. 426-36.000.
Calsonic Corporation: *See*—
Takahashi, Eiji, 4,976,461, Cl. 236-13.000.
Calvert, Barry G.; and Diedrich, Dan D., to Westvaco Corporation. Paperboard cannister fabrication method and apparatus. 4,976,797, Cl. 156-69.000.
Camarota, Richard J., to ITC Incorporated. Portlight for water craft. 4,976,212, Cl. 114-178.000.
Camco International Inc.: *See*—
Leismer, Dwayne D., 4,976,317, Cl. 166-321.000.
Campbell, Donald W.: *See*—
Galloway, F. Merrill; Campbell, Donald W.; and Runion, Tommie H., 4,976,047, Cl. 33-735.000.
Campbell, Henry F.: *See*—
Huang, Fu-Chih; Campbell, Henry F.; Learn, Keith S.; and Galemmo, Robert A., Jr., 4,977,162, Cl. 514-314.000.
Campsport, Inc.: *See*—
Pitchford, Gary; Pitchford, Steve; and Hyde, Paul, 4,977,509, Cl. 364-449.000.
Candela Laser Corporation: *See*—
Furumoto, Horace W.; Ceccon, Harry L.; and Hsia, James C., 4,977,571, Cl. 372-54.000.
Canon Kabushiki Kaisha: *See*—
Ebinuma, Ryuichi; Chiba, Yuji; and Mizusawa, Nobutoshi, 4,977,459, Cl. 358-296.000.
Enari, Masahiko; Shimokoriyama, Makoto; and Fujii, Akio, 4,977,452, Cl. 358-138.000.
Fukuda, Tsuyoshi, 4,977,421, Cl. 354-246.000.
Hasegawa, Mitsutoshi, 4,977,570, Cl. 372-50.000.
Hirose, Ryusho, 4,977,426, Cl. 355-53.000.
Komori, Shin; Zauma, Jun; and Watanabe, Yoshiaki, 4,977,412, Cl. 346-108.000.
Miyagawa, Masashi; Takenouchi, Masanori; and Ohkuma, Norio, 4,977,058, Cl. 430-138.000.
Oshima, Shigeru; and Takeshi, Kunio, 4,976,526, Cl. 350-463.000.
Shimada, Tetsuya; Itabashi, Satoshi; and Hatanaka, Katsunori, 4,977,096, Cl. 437-2.000.
Shimamura, Yoshiyuki, 4,977,536, Cl. 364-900.000.
Tamekuni, Yasuhiro; Amikura, Takashi; and Ohara, Toru, 4,977,457, Cl. 358-227.000.
Uchikata, Yoshio, 4,976,557, Cl. 400-565.000.
Yamanaka, Akihiro; Iida, Hiroshi; and Nozawa, Minoru, 4,977,413, Cl. 346-140.00R.
Canty, Thomas M. Camera viewing unit. 4,977,418, Cl. 354-63.000.
Cappellato, Bruno, to Fiat Aviazione S.p.A. System for lubricating mechanical members, in particular aircraft components, featuring a minimum emergency oil supply device. 4,976,335, Cl. 184-6.400.
Carchidi, Joseph E. Dental implant screw driver system. 4,976,617, Cl. 433-141.000.
Cargould, Barry D.; and Beebe, James C., to Illinois Tool Works Inc. Stepped rim for tire testing machine. 4,976,141, Cl. 73-146.000.
Carl, Arnd-Gunther: *See*—
Bachmann, Andreas; and Carl, Arnd-Gunther, 4,976,509, Cl. 350-96.230.
Carl Hurth Maschinen- und Zahnradfabrik GmbH & Co.: *See*—
Erhardt, Manfred; and Loos, Herbert, 4,976,044, Cl. 33-501.140.
Carl Schenck AG: *See*—
Jost, Gerhard; and Werner, Hans, 4,977,526, Cl. 364-567.000.
Carlo Erba Strumentazione S.p.A.: *See*—
Munari, Fausto, 4,976,750, Cl. 55-21.000.
Carlson, Eric J., to Motorola, Inc. Passive location method. 4,976,619, Cl. 434-16.000.
Carlson, Michael G., to Western Forms, Inc. Adjustable corner squaring strip for a concrete column form. 4,976,401, Cl. 249-194.000.
Carlson, Nils W.; Evans, Gary A.; and Kaiser, Charlie J., to David Sarnoff Research Center, Inc. Diode laser array. 4,976,539, Cl. 356-5.000.
Carlson, Robert B.; Cosgrove, Barbara J.; and Meredith, Paul T., to Boeing Company, The. Aircraft configuration with aft mounted engines. 4,976,396, Cl. 244-55.000.
Carmichael, Keith L.; and Runyan, James F., to Reliance Electric Company. Control system for mechanically adjustable speed motor drives. 4,976,186, Cl. 91-166.000.
Carolina Twist Drill, Inc.: *See*—
Garbarino, Carl, 4,976,325, Cl. 175-394.000.
Caroll, Rick. Static electricity eliminator in clothes dryers. 4,977,479, Cl. 361-220.000.
Caron, Richard N.: *See*—
Grob, James T.; and Caron, Richard N., 4,976,609, Cl. 431-326.000.
Carpenter, Jerry W. Quick release stringer. 4,976,382, Cl. 224-103.000.
Carpenter, Kenneth P.: *See*—
Liang, Rong-Chang; Simpson, William H.; Gyure, Katherine A.; and Carpenter, Kenneth P., 4,977,059, Cl. 430-138.000.
Carpenter, Lester E.: *See*—
Bieber, David; and Carpenter, Lester E., 4,976,340, Cl. 190-109.000.
Carpenter, Robert B.; and Wilson, William N., to Atlantic Richfield Company. Method of accelerating set of cement by washover fluid containing alkanolamine. 4,976,316, Cl. 166-291.000.
Carrier Corporation: *See*—
Hogan, Mark R., 4,976,115, Cl. 62-428.000.
Carrington, Andrew N., to Thorn EMI plc. Display device. 4,976,516, Cl. 350-343.000.
Carter Automotive Company: *See*—
Bollinger, Steven R., 4,976,237, Cl. 123-339.000.
Carter, William, to Water Works Supply Corporation. Sleeve adapter. 4,976,457, Cl. 285-158.000.
Cartier, Claude-Bernard: *See*—
Pacaud, Bernard; Popa, Jean-Michel; and Cartier, Claude-Bernard, 4,976,944, Cl. 423-347.000.
Cartry, Jean P.; and Fraissenet, Bruno, to Framatome. Device for lining a peripheral tube of a steam generator. 4,976,027, Cl. 29-727.000.
Carvell, William S.: *See*—
Perdue, Thomas E., Jr.; Bransky, Jeffrey D.; Carvell, William S.; Dettloff, David E.; Ischay, Duane K.; and Oberg, Kenneth H., 4,976,373, Cl. 220-335.000.
Casella, Robert A.: *See*—
Ward, Billy W.; Edwards, David, Jr.; and Casella, Robert A., 4,976,843, Cl. 204-298.360.
Cassar, Luigi: *See*—
Greco, Alberto; Busetto, Carlo; Cassar, Luigi; and Neri, Carlo, 4,977,259, Cl. 544-69.000.
Cassel, Timothy S., to Tucker Housewares, Inc. Container and sealing lid. 4,976,370, Cl. 220-306.000.
Cassella Aktiengesellschaft: *See*—
Kamutzki, Walter; and Keil, Karl-Heinz, 4,977,239, Cl. 528-310.000.

Cassidy, Stephen A.; and Yennadhiou, Peter, to British Telecommunications public limited company. Optical switch using directionally flexible optical fibres. 4,976,505, Cl. 350-96.150.

Casso, Christopher G.; Normore, Andrew D.; and Slagel, Peter S., to Anadrill, Inc. System and method for monitoring drill bit depth. 4,976,143, Cl. 73-151.500.

Caulfield, Thomas J.: *See*—
Nicolaou, Kyriacos C.; and Caulfield, Thomas J., 4,977,286, Cl. 552-4.000.

Cavanagh, Philip J.: *See*—
Marshall, Andrew; Colman, Derek; Cavanagh, Philip J.; and Dale, David P., 4,977,476, Cl. 361-18.000.

Cavazos, Amado F. Combination bread and tortilla toaster. 4,976,195, Cl. 99-391.000.

CDI consolidated devices inc: *See*—
Pohl, Peter, 4,976,133, Cl. 73-1.00C.

Cecchi, Joseph L.: *See*—
Knize, Randall J.; and Cecchi, Joseph L., 4,976,938, Cl. 423-249.000.

Ceccon, Harry L.: *See*—
Furumoto, Horace W.; Ceccon, Harry L.; and Hsia, James C., 4,977,571, Cl. 372-54.000.

Central Glass Company, Limited: *See*—
Maruyama, Yutaka; and Komoriya, Haruhiko, 4,977,232, Cl. 528-185.000.

Central Sprinkler Corporation: *See*—
Polan, George S., 4,976,320, Cl. 169-39.000.

Centre National de la Recherche Scientifique: *See*—
Sanchez, Victor; Biscans, Beatrice; Couderc, Jean-Pierre; and Riba, Jean-Pierre, 4,976,865, Cl. 210-635.000.

Ceram-Sna Inc.: *See*—
Delvaux, Pierre; and Lesmerises, Normand, 4,976,884, Cl. 252-62.000.

Ceramic Cooling Tower Company: *See*—
Bardo, Charles J., 4,976,895, Cl. 261-108.000.

Cercona, Inc.: *See*—
Helferich, Richard L.; and Schenck, Robert C., 4,976,760, Cl. 55-487.000.

Cerminara, Dominic, to Unisys Corporation. Multiple frequency clock system. 4,977,581, Cl. 375-107.000.

Ceron, Daniel; Lodomez, Christian; Hano, Paul; and Erard, Jose, to Euro-Locks, S.A.-N.V. Locks having removable barrels and control tumblers therefor. 4,976,123, Cl. 70-369.000.

Cesa, Mark C.; Rinz, James E.; Klopman, Gilles; and Kopp, Teodora T., to Standard Oil Company, The. Olefinic N,N'-disubstituted ureas. 4,977,272, Cl. 548-336.000.

Cha, Alice S.: *See*—
Hirsh, Kenneth R.; Schanbacher, Larry M.; and Cha, Alice S., 4,976,983, Cl. 426-594.000.

Chabries, Douglas M.; and Christiansen, Richard W., to Unisys Corporation. Method and apparatus for processing sampled data signals by utilizing preconvolved quantized vectors. 4,977,604, Cl. 382-42.000.

Chace, Mark S.: *See*—
Decker, James D.; Burch, Wendell D.; Brady, Daniel F.; Hinzman, Gary W.; Kromrey, Edward P.; Sanville, Katherine M.; Southworth, Donald R.; Chace, Mark S.; and Peloquin, Perry M., 4,976,137, Cl. 73-53.000.

Chai, Haw R.: *See*—
Spotts, James C.; and Chai, Haw R., 4,977,488, Cl. 362-183.000.

Chait, Brian T.: *See*—
Chowdhury, Swapan K.; Katta, Viswanatham; and Chait, Brian T., 4,977,320, Cl. 250-288.000.

Chakrabarti, Jiban Kumar; and Hotten, Terrence M., to Lilly Industries Limited. Benzodiazepine compounds and their use as pharmaceuticals. 4,977,150, Cl. 514-220.000.

Challandes, Claude, to Sontex, S.A. Fluidic flowmeter. 4,976,155, Cl. 73-861.190.

Champion International Corporation: *See*—
Rathbone, Charles S., 4,976,394, Cl. 229-117.140.

Chan, Paul S. Disposable, splash-suppressing toilet seat cover with folded annular and bridging inner portions. 4,975,990, Cl. 4-243.000.

Chand, Naresh, to AT&T Bell Laboratories. Method of making an article comprising a III/V semiconductor device. 4,977,103, Cl. 437-105.000.

Chang, Hershow; Kim, Seong; and Motoyama, Tetsuro, to Ricoh Company, Ltd.; and Ricoh Corporation. Laser printer controller flexible frame buffer architecture which allows software to change X and Y dimensions of the buffer. 4,977,519, Cl. 364-519.000.

Chang, Robert W. H.: *See*—
Norbury, Robert J.; and Chang, Robert W. H., 4,976,961, Cl. 424-401.000.

Charles, Herbert N., to Siemens Automotive L.P. Engine camshaft phasing. 4,976,229, Cl. 123-90.170.

Charlot, Didier: *See*—
Sirat, Gabriel; Dufresne, Eric; Charlot, Didier; and Maruani, Alain, 4,976,504, Cl. 350-373.000.

Charlton Mineral Associates Pty. Ltd.: *See*—
Mainwaring, David; and Cadzow, Mark, 4,976,781, Cl. 75-710.000.

Charmilles Technologie S.A.: *See*—
Briffod, Jean, 4,977,303, Cl. 219-69.120.

Chartex International plc: *See*—
Hessel, Lasse, 4,976,273, Cl. 128-844.000.

Chateau Yaldara PTY. Ltd.: *See*—
Thumm, Hermann, 4,976,974, Cl. 426-14.000.

Chavez, Domingo: *See*—
Johnson, Mark S.; Beaver, Edward; Jovanovic, Manojlo; and Chavez, Domingo, 4,976,977, Cl. 426-96.000.

Chea, Chhiv K.: *See*—
Prukop, Gabriel; and Chea, Chhiv K., 4,976,315, Cl. 166-270.000.

Checchinato, Bruno: *See*—
Gottardo, Fulvio; and Checchinato, Bruno, 4,976,635, Cl. 439-849.000.

Chemco Technologies, Inc.: *See*—
Stockel, Elfriede; and Buchan, Cynthia L., 4,976,997, Cl. 427-380.000.

Chen, Evan N., to Warner-Lambert Company. Flexible razor head. 4,976,028, Cl. 30-49.000.

Chen, George T. Y.: *See*—
Pelizzari, Charles A.; and Chen, George T. Y., 4,977,505, Cl. 364-413.190.

Chen, Jing-Den: *See*—
Liang, Rong-Chang; Hipps, Jesse, Sr.; and Chen, Jing-Den, 4,977,060, Cl. 430-138.000.

Chen, Walter Y.; and Haddad, Richard A., to NYNEX Corporation. Dual mode LMS nonlinear data echo canceller. 4,977,591, Cl. 379-410.000.

Cheney, LeRoy C. Sectioned and height adjustable singles sticks with measurement device. 4,976,432, Cl. 273-29.00B.

Chevron Research Company: *See*—
Johnson, David R., 4,976,848, Cl. 208-251.00H.

Chia, Meang; and Ta, Larry. Jeweler's hammer bit. 4,976,033, Cl. 30-366.000.

Chiao, Yu-Chih: *See*—
Mani, Krishnamurthy N.; Chlanda, Frederick P.; and Chiao, Yu-Chih, 4,976,838, Cl. 204-182.300.

Chiba, Masahiro, to Olympus Optical Co., Ltd. Optical system for endoscopes to be used for observing the interior of pipes. 4,976,524, Cl. 350-432.000.

Chiba, Yuji: *See*—
Ebinuma, Ryuichi; Chiba, Yuji; and Mizusawa, Nobutoshi, 4,977,459, Cl. 358-296.000.

Chin, Albert K.; and Fogarty, Thomas J., to Fogarty, Thomas J. Dilatation catheter and constant pressure syringe and method of using the same. 4,976,725, Cl. 606-192.000.

Chin, Tim; and Kohlman, Susan D., to Raytheon Company. Gasket impervious to electromagnetic energy. 4,977,295, Cl. 174-35.0GC.

Chino, Naoyoshi; Hiraki, Yasuhito; and Sato, Tsunehiko, to Fuji Photo Film Co., Ltd. Coating method. 4,976,992, Cl. 427-131.000.

Chippett, Simon; and Conviser, Stephen A., to Union Carbide Corporation. Sterilization method. 4,976,922, Cl. 422-34.000.

Chips and Technologies, Incorporated: *See*—
Pleva, Robert M.; and Randall, Martin, 4,977,398, Cl. 340-793.000.

Chiquita Brands, Inc.: *See*—
Battaglia, Anthony D., 4,976,032, Cl. 30-298.000.

Chisari, Paul R.: *See*—
Patel, Mansukh M.; Chisari, Paul R.; and Broderick, Kevin B., 4,976,972, Cl. 426-3.000.

Chiu, Chung-Wai, to National Starch and Chemical Investment Holding Corporation. Modified starch emulsifier characterized by shelf stability. 4,977,252, Cl. 536-102.000.

Chiyajo, Masanobu; Kuroki, Toshio; and Sakata, Eiji, to Kyushu Hitachi Maxell, Ltd. Rechargeable type small electric appliance. 4,977,042, Cl. 429-49.000.

Chlanda, Frederick P.: *See*—
Mani, Krishnamurthy N.; Chlanda, Frederick P.; and Chiao, Yu-Chih, 4,976,838, Cl. 204-182.300.

Chou, Te-Chang: *See*—
Kuo, Wen-Chieh; Lin, Chia-Hui; Chou, Te-Chang; and Liang, Yuan-Hsiung, 4,977,397, Cl. 340-710.000.

Chowdhury, Swapan K.; Katta, Viswanatham; and Chait, Brian T., to Rockefeller University, The. Electrospray ionization mass spectrometer with new features. 4,977,320, Cl. 250-288.000.

Christiansen, Richard W.: *See*—
Chabries, Douglas M.; and Christiansen, Richard W., 4,977,604, Cl. 382-42.000.

Chrysler Corporation: *See*—
McCambridge, John M., 4,977,559, Cl. 371-57.100.

Chuah, Hoe: *See*—
Arnold, Fred E.; Helminiak, Thaddeus E.; Wiff, Donald R.; Tan, Loon S.; Hwang, Wen F.; and Chuah, Hoe, 4,977,223, Cl. 525-432.000.

Chuma, Toshio: *See*—
Nakajima, Makoto; Ohashi, Yoshio; Chuma, Toshio; Hatori, Kazuo; Araki, Isao; Koizumi, Masahiro; Onuki, Jin; Suzuki, Hitoshi; and Okikawa, Susumu, 4,976,393, Cl. 228-111.000.

Chung, Ding Y.: *See*—
Debroy, Tapan K.; and Chung, Ding Y., 4,976,833, Cl. 204-181.700.

Church, John; Oelschlaegel, Victor R.; and Emery, J. Donald, to Parker Hannifin Corporation. Universal self-venting drain valve. 4,976,285, Cl. 137-588.000.

Cianciola, Vince. Stove top grill. 4,976,252, Cl. 126-27.000.

Ciba-Geigy Corporation: *See*—
Bagga, Madan M., 4,977,214, Cl. 525-109.000.
Fujimoto, Roger A.; Francis, John E.; and Hutchison, Alan J., 4,977,144, Cl. 514-46.000.
Hatton, Kevin B.; Irving, Edward; Walshe, Josephine M. A.; and Mallaband, Anne, 4,977,293, Cl. 558-153.000.
Hausermann, Walter; Maurer, Max; and Friedel, Thomas, 4,977,169, Cl. 514-346.000.
Walker, Gordon N., 4,977,181, Cl. 514-423.000.

Cibie Projecteurs: *See—*
Leleve, Joel, 4,977,360, Cl. 318-596.000.

Ciolczyk, Jean-Pierre: *See—*
Simon, Jean-Michel; Taniere, Jacques; Ciolczyk, Jean-Pierre; and Domer, Michel, 4,976,412, Cl. 248-634.000.

Cippert, Piotr: *See—*
Czernecki, Andrzej; and Cippert, Piotr, 4,976,161, Cl. 73-864.170.

Cirami, Salvatore. Prepackaged, disposable, cat litter box. 4,976,218, Cl. 119-168.000.

CKD Praha, Kombinat: *See—*
Herman, Zdenek, 4,976,226, Cl. 123-64.000.

Claas Ohg: *See—*
Dammann, Johannes; Heidjann, Franz; and Roderfeld, Heinrich, 4,976,654, Cl. 460-80.000.

Clark, Rita M. Diabetic diet plan aid and method. 4,976,622, Cl. 434-127.000.

Clarke, Denis K. C.: *See—*
Wixon, Philip A. M.; and Clarke, Denis K. C., 4,976,185, Cl. 89-35.010.

Claus, Michel: *See—*
Merigaud, Bernard; Claus, Michel; and Passerieux, Robert, 4,977,302, Cl. 219-10.55E.

Clavel, Reymond, to Sogeva S.A. Device for the movement and positioning of an element in space. 4,976,582, Cl. 414-729.000.

Clayton, Richard W.: *See—*
Harper, Jack D.; Clayton, Richard W.; and Olikara, Philip, 4,977,408, Cl. 343-792.500.

CLE: *See—*
Paliard, Maurice; Martin, Jean-Marc; Cochet, Francis; and Valdelievre, Benoit, 4,976,469, Cl. 241-24.000.

Clemson University: *See—*
Williamson, Robert E.; McHugh, Carl M.; and Hood, Clarence E., 4,976,094, Cl. 56-330.000.

Cline, John; and Gentile, Ken, to Mitel Corporation. Voltage monitor **for in-circuit testing. 4,977,530, Cl. 364-579.000.**

Clinical Technologies Associates, Inc.: *See—*
Steiner, Solomon S., 4,976,968, Cl. 424-491.000.

Clough, John M.: *See—*
Anthony, Vivienne M.; Clough, John M.; and Godfrey, Christopher R. A., 4,976,771, Cl. 71-90.000.

Clusserath, Ludwig, to Seitz Enzinger Noll Maschinenbau Aktiengesellschaft. **Apparatus for filling containers with carbonated liquids** under counterpressure as dispensed having different filling characteristics by adjusting pressure differential without changing flow control **mechanism. 4,976,295, Cl. 141-39.000.**

CMI International, Inc.: *See—*
Wuepper, Thomas E.; Grauherr, Keith R.; Tate, Orren R.; and Philo, Alfred D., 4,976,303, Cl. 164-29.000.

Coal Industry (Patents) Limited: *See—*
Lewins, Foster; and Gammons, Timothy S., 4,976,495, Cl. 299-1.000.

Coates, George J. Valve seal for rotary valve engine. 4,976,232, Cl. 123-190.00E.

Coatex S.A.: *See—*
Martineu, Pierre; Saunier, Christiane; Rousset, Jacky; and Jacquemet, Christian, 4,977,192, Cl. 521-56.000.

Cochet, Francis: *See—*
Paliard, Maurice; Martin, Jean-Marc; Cochet, Francis; and Valdelievre, Benoit, 4,976,469, Cl. 241-24.000.

Coffindaffer, Timothy W., to Procter & Gamble Company, The. Process for recovering gelled aqueous liquid fabric softener. 4,976,878, **Cl. 252-8.600.**

Cogswell, James A., II; and Coulter, James L., to General Motors Corporation. Anti-spin hydraulic brake system. 4,976,500, Cl. 303-110.000.

Colaluca, Carmine J., Jr.: *See—*
Bay, Peter M.; Colaluca, Carmine J., Jr.; and Pataki, Steven, 4,976,399, Cl. 244-161.000.

Colin Electronics Co., Ltd.: *See—*
Kurosawa, Kimimasa; Harada, Chikao; Sakai, Hiroshi; and Niwa, Minoru, 4,976,268, Cl. 128-687.000.

College, John W.: *See—*
Lee, Yungli J.; Benson, Lewis B.; and College, John W., 4,976,937, Cl. 423-242.000.

Collington, Eric W.; Hallett, Peter; Wallis, Christopher J.; Wadsworth, **Alan; and Hayes, Norman F., to Glaxo Group Limited. Aminocy**clopentanol acids and esters and their preparation and pharmaceutical formulation. 4,977,163, Cl. 514-317.000.

Colman, Derek: *See—*
Marshall, Andrew; Colman, Derek; Cavanagh, Philip J.; and Dale, David P., 4,977,476, Cl. 361-18.000.

Com-Pac International, Inc.: *See—*
Siebert, Lester D., 4,976,811, Cl. 156-66.000.

Cominco Ltd.: *See—*
Boateng, Daniel A. D., 4,976,832, Cl. 204-98.000.

Commanday, Maurice R. Apparatus and method to control extraction of lubricating oil. 4,976,235, Cl. 123-196.00R.

Comp-Aire Systems, Inc.: *See—*
Helmus, Martin C., 4,976,757, Cl. 55-355.000.

Concept, Inc.: *See—*
Bays, F. Barry; Trott, Arthur F.; and Marchand, Sam R., 4,976,715, Cl. 606-77.000.

Cone, Stanley H.: *See—*
Thornton, Peter B.; Cone, Stanley H.; and Booz, George W., 4,977,016, Cl. 428-225.000.

Connolly, Randolph: *See—*
Mahaney, Bernard F., Jr.; Beck, Carl W.; Nixon, Kim B.; Connolly, Randolph; and Nunemaker, Terry V., 4,976,576, Cl. 411-121.000.

Conoco Specialty Products Inc.: *See—*
Grey, Mark L., 4,976,872, Cl. 210-739.000.

Conservatome S.A.: *See—*
Martineu, Pierre; Saunier, Christiane; Rousset, Jacky; and Jacquemet, Christian, 4,977,192, Cl. 521-56.000.

Consiglio Nazionale delle Richerche: *See—*
Falcial, Riccardo; Scheggi, Annamaria V.; Baldini, Francesco; and Bechi, Paolo, 4,976,265, Cl. 128-634.000.

Consolidated Natural Gas Service Company, Inc.: *See—*
Swenson, Paul F., 4,976,464, Cl. 237-81.000.

Continental Group, Inc., The: *See—*
Krishnakumar, Suppayan M.; Friendship, Kenneth F. M.; Mahajan, Gautam K.; and Pocock, John F. E., 4,977,005, Cl. 428-36.920.

Conviser, Stephen A.: *See—*
Chippett, Simon; and Conviser, Stephen A., 4,976,922, Cl. 422-34.000.

Cook, Alexander: *See—*
Kirchberg, Maurice A., Jr.; and Cook, Alexander, 4,977,492, Cl. 363-41.000.

Cooke, Jeffery V. Horse feeder. 4,976,222, Cl. 119-60.000.

Cooke, Steven J., to Liquid Air Corporation. Process for analyzing carbonyl sulfide in a gas. 4,977,093, Cl. 436-119.000.

Coombs, Peter M.; and Graafmans, Hans, to Gradco Systems, Inc. Decurling and offsetting device. 4,977,432, Cl. 355-309.000.

Cooney, Leo A. Hydraulic brake intensifier. 4,976,190, Cl. 91-535.000.

Coontz, James D. Shoulder strap assembly having limited stretchability. 4,976,388, Cl. 224-264.000.

Cooper Industries, Inc.: *See—*
Blackman, William C., 4,976,048, Cl. 33-767.000.

Copolymer Rubber & Chemical Corporation: *See—*
Sunseri, Ronald H.; and O'Rourke, Michael W., 4,977,217, Cl. 525-286.000.

Coquerel, Michel J. L., to Equipement Industriel Normand. Safety device for a distributor member connected to a distributed product totalizing element. 4,977,391, Cl. 340-522.000.

Corbelli, Luigi: *See—*
Bargigia, Gianangelo; Re, Alberto; Corbelli, Luigi; Johns, Ken; Flabbi, Luciano; and Srinivasan, Padmanabhan, 4,977,222, Cl. 525-359.300.

Corless, Peter F.: *See—*
Brittelli, David R.; Corless, Peter F.; Gregory, Walter A.; and Park, Chung-Ho, 4,977,173, Cl. 514-376.000.

Cornelison, Richard C.; and Whittenberger, William A., to W. R. Grace & Co.-Conn. Electrically heated catalytic converter. 4,976,929, Cl. 422-174.000.

Cornerboard, Inc.: *See—*
Macaluso, Vincent A., 4,976,374, Cl. 220-453.000.

Corning, Incorporated: *See—*
Allaire, Roger A., 4,976,761, Cl. 65-3.200.
Amundson, W. Duane, Jr.; Boek, Heather; Hares, George B.; and Pfitzenmaier, Robert W., 4,977,110, Cl. 501-7.000.
Brown, Jacqueline L.; Howe, Stephen E.; and Hultman, Sheryl L., 4,977,029, Cl. 428-429.000.
Goepfert, Serge P. P.; and Guillevic, Gildas J. M., 4,977,028, Cl. 428-426.000.
Taylor, Mark P., 4,976,765, Cl. 65-33.000.

Corning Limited: *See—*
Davey, Rodney J.; and Sadler, Alan A., 4,976,519, Cl. 350-96.230.

Correa, Jose L.; Stumpf, Robert C.; Farnum, Charles L.; and Roos, **Leo, to Morton International, Inc. Wet lamination process and appa**ratus. 4,976,817, Cl. 156-555.000.

Cosgrove, Barbara J.: *See—*
Carlson, Robert B.; Cosgrove, Barbara J.; and Meredith, Paul T., 4,976,396, Cl. 244-55.000.

Cote, Richard: *See—*
Verbiar, Clifford P.; and Cote, Richard, 4,976,084, Cl. 52-713.000.

Cotter, David: *See—*
Smith, David W.; Cotter, David; and Wyatt, Richard, 4,977,620, Cl. 455-619.000.

Couderc, Jean-Pierre: *See—*
Sanchez, Victor; Biscans, Beatrice; Couderc, Jean-Pierre; and Riba, Jean-Pierre, 4,976,865, Cl. 210-635.000.

Coulter, James L.: *See—*
Cogswell, James A., II; and Coulter, James L., 4,976,500, Cl. 303-110.000.

Coye, Peter. Latex container with integral holding straps, and method and apparatus for making same. 4,976,816, Cl. 156-537.000.

CPC International Inc.: *See—*
Kinnersley, Alan M.; and Henderson, Wayne E., 4,976,767, Cl. 71-26.000.

Crane Carrier Company: *See—*
Yeazel, Kenneth L., 4,976,187, Cl. 91-173.000.

Crane, Patrick E. Optical collimator. 4,977,407, Cl. 343-753.000.

Cranfield Institute: *See—*
Adkins, Richard C., 4,976,349, Cl. 244-207.000.

Crawford, Mark: *See—*
Walder, Anthony J.; Solomon, Donald D.; Beck, Richard W.; Lambert, James M.; Ignatius, Timothy; and Crawford, Mark, 4,976,697, Cl. 604-164.000.

Crawford, William B.; and Decuir, Perry, Sr. T-slot mandrel and kick**over tool. 4,976,314, Cl. 166-117.500.**

Creative Research & Manufacturing: *See—*
Mehl, Donald N., 4,976,269, Cl. 128-754.000.

Creighton, Thomas E. Process for the production of a protein. 4,977,248, Cl. 530-412.000.

Cremer, Jay T.: *See*—
Tatchyn, Roman O.; Csonka, Paul L.; and Cremer, Jay T., 4,977,384, Cl. 335-210.000.

Crimmins, James W. Distributed infrared communication system. 4,977,619, Cl. 455-607.000.

Croce, Michael R.; and Brilliant, Stuart D., to Witco Corporation. Stabilization and foaming of polyvinylchloride resins. 4,977,193, Cl. 521-85.000.

Croche, Klaus: *See*—
Schriewer, Michael; Croche, Klaus; Zeiler, Hans-Jonchim; and Hetzner, Karl G., 4,977,263, Cl. 544-329.000.

Cross, David C.; and Holloway, William G., to Subsidiary of Newman Tonks, Inc. Monarch Hardware & Manufacturing Co., Inc. Manual and electrical mechanism for unlocking a bolt. 4,976,476, Cl. 292-92.000.

Cross, Leslie E.: *See*—
Giniewicz, Jayne R.; Newnham, Robert E.; Cross, Leslie E.; and Safari, Ahmad, 4,977,547, Cl. 367-157.000.

Crouzet (Societe Anonyme francaise): See—
Perez-Ruiz, Jose-Maria; and Mendoza-Mendoza, Andres, 4,977,299, Cl. 200-5.00B.

Crozat, Georges; and Lebrun, Michel, to Faiveley Enterprises; and Societe Nationale Elf Aquitaine. Device and process for producing cold and/or heat by solid-gas reaction. 4,976,117, Cl. 62-480.000.

Crozer, Veva W. Water-based wood stain. 4,976,782, Cl. 106-19.000.

Crutchfield, E. Bryant, to Mead Corporation, The. Waste basket simulated as a basketball hoop and net. 4,976,355, Cl. 206-457.000.

CRYCO Twenty-Two, Inc.: See—
Yates, Cleon R., 4,976,610, Cl. 432-11.000.

Csonka, Paul L.: *See*—
Tatchyn, Roman O.; Csonka, Paul L.; and Cremer, Jay T., 4,977,384, Cl. 335-210.000.

Cuda, Joseph. Laser manipulator. 4,976,528, Cl. 350-635.000.

Culberson, Doris A.; and Mathias, Lon J., to University of Southern Mississippi, The. Polymeric compositions for optical devices. 4,977,229, Cl. 528-26.000.

Cumming, J. Stuart. Intraocular lens insertion device. 4,976,716, Cl. 606-107.000.

Cummins Engine Company, Inc.: *See*—
Stang, John H.; Moore, Christine H.; and Ouwerkerk, Rien, 4,976,225, Cl. 123-41.740.

Cunningham, David W.; and Esakoff, Gregory F., to Lee Colortran Inc. Dimmer rack. 4,977,484, Cl. 361-429.000.

Cunningham, Isaiah V. Stake driving tool. 4,976,483, Cl. 294-92.000.

Curran, Robert J., to Derlan Manufacturing Inc. Lifting apparatus and lifting arm assembly for use therein. 4,976,336, Cl. 187-8.500.

Curry, Jimmie L.: *See*—
Gibbs, Walden L., Jr.; Curry, Jimmie L.; and Mostyn, William T., 4,977,517, Cl. 364-510.000.

Curry, Leonard O. Portable tire x-ray apparatus and method. 4,977,586, Cl. 378-61.000.

Cyclofil (Proprietary) Limited: See—
Prinsloo, Willem J. C.; de Villiers, Pierre; and van Dijken, Marten C., 4,976,748, Cl. 55-1.000.

Cyclone Products Corporation: See—
McLellan, Michael F.; and Abhari, Reza S., 4,976,389, Cl. 224-328.000.

Czernecki, Andrzej; and Cippert, Piotr, to Przedsiebiorstwo Polonijno-Zagraniczne Plastomed. Fluid dispensing device. 4,976,161, Cl. 73-864.170.

Dacey, Ernest A., Jr., to Utica Enterprises, Inc. Method and apparatus of establishing the position of a datum reference from an object having dimensional variations within a tolerance range. 4,976,026, Cl. 29-714.000.

Dahlgren, Arthur; Kallrot, Magnus; and Stromblad, Mats, to Alfa-Laval Thermal AB. Plate heat exchanger with a double-wall structure. 4,976,313, Cl. 165-167.000.

Dai Nippon Insatsu Kabushiki Kaisha: *See*—
Ishii, Sumio; Fukuda, Tetsuya; and Kani, Nobumoto, 4,976,805, Cl. 156-100.000.

Daicel Chemical Industries, Ltd.: *See*—
Toda, Fumio, 4,976,834, Cl. 204-157.690.

Daikin Industries Ltd.: *See*—
Hisamoto, Iwao; Hirai, Masaru; and Ishikawa, Sueyoshi, 4,976,741, Cl. 8-115.600.
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.
Yoshimura, Tatsushiro; Tomihashi, Nobuyuki; and Simasaki, Shuhei, 4,977,221, Cl. 525-356.000.

Dainippon Screen Mfg. Co., Ltd.: *See*—
Ikuta, Kunio, 4,977,464, Cl. 358-448.000.
Yoshikawa, Shoichi; Awazu, Yasunobu; and Nishimura, Eiji, 4,977,067, Cl. 430-398.000.

Dale, David P.: *See*—
Marshall, Andrew; Colman, Derek; Cavanagh, Philip J.; and Dale, David P., 4,977,476, Cl. 361-18.000.

D'Alfonso, David A.: *See*—
Higson, James R.; D'Alfonso, David A.; and Walls, Robert R., 4,976,259, Cl. 128-200.180.

Dallas Semiconductor Corporation: *See*—
Dias, Donald R.; and Scherpenberg, Francis A., 4,977,537, Cl. 364-900.000.

D'Amico, Dennis. Buoy with self-ejecting weight. 4,976,641, Cl. 441-023.000.

Dammann, Johannes; Heidjann, Franz; and Roderfeld, Heinrich, to Claas Ohg. Self-propelling harvester thresher. 4,976,654, Cl. 460-80.000.

Dams, Franciscus J. L., to U.S. Philips Corporation. Asynchronous duplex data communication for requesting services. 4,977,555, Cl. 370-29.000.

Dana Corporation: *See*—
Davis, Jeffrey L.; and Byler, Jay D., 4,976,166, Cl. 74-512.000.

Daniell, Christopher H. Parasite remover. 4,976,718, Cl. 606-131.000.

Daniels, Lonnie E., to Terrell, Steven J.; and Terrell, Joe. Spare tire storage apparatus. 4,976,384, Cl. 224-42.230.

Daniels, Michael J.: *See*—
Zegel, Douglas R.; Jensen, Gary S.; Hernick, Mark R.; and Daniels, Michael J., 4,976,080, Cl. 52-239.000.

Danno, Yoshiaki: *See*—
Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, 4,976,241, Cl. 123-425.000.

Dantex Explosives (Proprietary) Limited: *See*—
Zimmermann, Leon M., 4,976,793, Cl. 149-21.000.

Darner, James C.: *See*—
Stoermer, Ralph T., III; and Darner, James C., 4,976,931, Cl. 422-211.000.

Darsey, Ralph J.; and Hurd, William J., to AT&T Bell Laboratories. Apparatus for recoating spliced lengths of optical fibers. 4,976,596, Cl. 425-117.000.

Dash, Georgia P.; and Borton, Dorothy L. Endoscopy shield. 4,976,254, Cl. 128-4.000.

Davey, Rodney J.; and Sadler, Alan A., to BICC plc; and Corning Limited. Propellable optical fiber cable. 4,976,519, Cl. 350-96.230.

David, Michel. Apparatus for determining the formulation of paint for use in bodywork repair. 4,977,522, Cl. 364-526.000.

David Sarnoff Research Center, Inc.: *See*—
Carlson, Nils W.; Evans, Gary A.; and Kaiser, Charlie J., 4,976,539, Cl. 356-5.000.

Davies, John H., to Fifth Generation Technology (Manufacturing) Ltd. Fluorescent light fitting and system. 4,977,490, Cl. 362-221.000.

Davila, Dan I.; Midkiff, John A.; and Ekanayake, Dulip, to Siecor Corporation. Communication outlet. 4,976,510, Cl. 350-96.200.

Davis Electric Wallingford Corporation: *See*—
Pepe, David, 4,976,599, Cl. 425-131.100.

Davis, Glenn R., to Otis Engineering Corporation. Manual blowout preventer with invertible rams. 4,976,402, Cl. 251-1.300.

Davis, Jeffrey L.; and Byler, Jay D., to Dana Corporation. Electronic foot pedal. 4,976,166, Cl. 74-512.000.

Davis, John S., to BASF Corporation. Support ring with additional void space. 4,976,823, Cl. 202-158.000.

Davis, Walter R.; and Nahrup, Todd H., to Water Parks, Inc. Apparatus and method for generating waves in a body of water. 4,976,570, Cl. 405-79.000.

Dayco Products, Inc.: *See*—
Miranti, Joseph P., Jr., 4,976,662, Cl. 474-205.000.

Debroy, Tapan K.; and Chung, Ding Y., to Du Pont de Nemours, E. I., and Company. Electrodeposition coatings containing blocked tetramethylxylene diisocyanate crosslinker. 4,976,833, Cl. 204-181.700.

Decker, James D.; Burch, Wendell D.; Brady, Daniel F.; Hinzman, Gary W.; Kromrey, Edward P.; Sanville, Katherine M.; Southworth, Donald R.; Chace, Mark S.; and Peloquin, Perry M., to Ecolab Inc. Chemical mixing and dispensing system. 4,976,137, Cl. 73-53.000.

Decker, Jean M.: *See*—
Muchmore, Andrew V.; and Decker, Jean M., 4,977,244, Cl. 530-350.000.

De Clercq, Arnold; Bergold, Wolfram; Degen, Hans-Juergen; and Melzer, Jaroslav, to BASF Aktiengesellschaft. Antifoam based on oil-in-water emulsion. 4,976,888, Cl. 252-358.000.

De Courcy, David R.: *See*—
Barker, Sidney A.; Baggett, Neil; Stevenson, John; George, Raymond D.; De Courcy, David R.; Hammond, Timothy; and Bradley, Martin, 4,977,209, Cl. 524-594.000.

Decuir, Perry, Sr.: *See*—
Crawford, William B.; and Decuir, Perry, Sr., 4,976,314, Cl. 166-117.500.

Dee, William J.: *See*—
Spivey, James R.; Dee, William J.; and Brice, William F., 4,976,562, Cl. 401-123.000.

Degen, Hans-Juergen: *See*—
De Clercq, Arnold; Bergold, Wolfram; Degen, Hans-Juergen; and Melzer, Jaroslav, 4,976,888, Cl. 252-358.000.

de Groot, Roy: *See*—
Leonov, Mark; and de Groot, Roy, 4,976,002, Cl. 15-304.000.

Degussa Aktiengesellschaft: *See*—
Merigaud, Bernard; Claus, Michel; and Passerieux, Robert, 4,977,302, Cl. 219-10.55E.
Pauli, Ingo; Kleinschmit, Peter; and Schwarz, Rudolf, 4,976,943, Cl. 423-336.000.

Deka, Mitrajyoti, to Bethlehem Steel Corporation. Ultrasonic transducers. 4,976,150, Cl. 73-644.000.

Delabassee, Denis: *See*—
Bernat, Andre ; Delabassee, Denis; Frehel, Daniel; Maffrand, Jean-Pierre; and Vallee, Eric, 4,977,168, Cl. 514-330.000.

Delagebeaudeuf, Daniel; Derewonko, Henri; Godart, Jean J.; Resneau, Patrick; and Gibeau, Pierre, to Thomson Hybrides et Microondes.

Field-effect semiconductor device comprising an ancillary electrode. 4,977,434, Cl. 357-22.000.

Delamare, Guy R., to Technip Geoproduction. Inflatable vault having a multilobed double wall. 4,976,074, Cl. 52-2.003.

Delaware Capital Formation, Inc.: *See*—
Holland, Gordon A., 4,976,338, Cl. 187-110.000.

Delco Electronics Corporation: *See*—
Blackwell, Andrew K., 4,977,525, Cl. 364-565.000.
Yoder, Douglas J.; Brown, Ronald E.; Stevenson, Paul E.; Hornback, Donald L.; and Leisure, Ronald K., 4,977,101, Cl. 437-51.000.

Della Penna, Gino: *See*—
Baradel, Agostino; Della Penna, Gino; Gulinelli, Silvio; Valdiserri, Mario; and Robertiello, Andrea, 4,976,864, Cl. 210-610.000.

Deltec Electronics Corporation: *See*—
Handler, Howard, 4,977,334, Cl. 307-260.000.

DeLucia, Paul V. Arrow system. 4,976,443, Cl. 273-421.000.

Delvaux, Pierre; and Lesmerises, Normand, to Ceram-Sna Inc. Heat resistant composition processable by wet spinning. 4,976,884, Cl. 252-62.000.

Demey, C. Fred, III: *See*—
McConnell, Bain C.; Jarvis, William R.; Demey, C. Fred, III; and Maddrey, James G., Jr., 4,976,326, Cl. 177-145.000.

Denda, Akira, to NEC Corporation. Semiconductor integrated circuit having a MOS transistor with a threshold level to enable a level conversion. 4,977,339, Cl. 307-475.000.

Denda, Masaki: *See*—
Onuki, Hideki; and Denda, Masaki, 4,977,410, Cl. 346-76.0PH.

Denis, Jacques; Montagne, Xavier; Mulard, Philippe; and Eber, Daniele, to Institut Francais du Petrole. Formulations of nitrogenated additives for engine fuels and the engine fuels containing them. 4,976,746, Cl. 44-330.000.

Denmark, Scott: *See*—
Livingston, Douglas A.; Pearlman, Bruce A.; and Denmark, Scott, 4,977,255, Cl. 540-4.000.

Dennis, Donald W.: *See*—
Linder, Donald L.; Goode, Steve H.; Kazecki, Henry L.; Dennis, Donald W.; and Baker, James C., 4,977,616, Cl. 455-277.000.

Derewonko, Henri: *See*—
Delagebeaudeuf, Daniel; Derewonko, Henri; Godart, Jean J.; Resneau, Patrick; and Gibeau, Pierre, 4,977,434, Cl. 357-22.000.

Derlan Manufacturing Inc.: *See*—
Curran, Robert J., 4,976,336, Cl. 187-8.500.

Derrick, Steven J. Apparatus and method for respired gas collection and analysis. 4,976,260, Cl. 128-200.240.

Descamps, Marcel; and Verstraeten, Walter, to Sanofi. 4-hydroxyindole derivatives, the process for preparation thereof and their use. 4,977,274, Cl. 548-455.000.

DeSouza, Peter V.: *See*—
Bahl, Lalit R.; DeSouza, Peter V.; Mercer, Robert L.; and Picheny, Michael A., 4,977,599, Cl. 381-43.000.

Dettloff, David E.: *See*—
Perdue, Thomas E., Jr.; Bransky, Jeffrey D.; Carvell, William S.; Dettloff, David E.; Ischay, Duane K.; and Oberg, Kenneth H., 4,976,373, Cl. 220-335.000.

Deublin Company: *See*—
Kubala, Zbigniew, 4,976,282, Cl. 137-580.000.

de Villiers, Pierre: *See*—
Prinsloo, Willem J. C.; de Villiers, Pierre; and van Dijken, Marten C., 4,976,748, Cl. 55-1.000.

Dewald, Jack J. Method and apparatus for treating hazardous waste materials. 4,976,210, Cl. 110-246.000.

Dewar, Colin A.; and Artus, Kevin J., to Imperial Chemical Industries PLC. Films and tapes. 4,977,015, Cl. 428-221.000.

Dewitz, Thomas S., to Shell Oil Company. Stripping and depressurization of solids and gas mixture. 4,976,755, Cl. 55-161.000.

Diaddario, Leonard L., Jr.; and Schroeder, Mark A., to Hoechst Celanese Corporation. Electrosynthesis of sodium dithionite. 4,976,835, Cl. 204-92.000.

Diafoil Company, Limited: *See*—
Nozawa, Seiichi; Utsumi, Shigeo; and Nakata, Michio, 4,977,230, Cl. 528-125.000.
Utsumi, Shigeo, 4,977,020, Cl. 428-323.000.

Dias, Donald R.; and Scherpenberg, Francis A., to Dallas Semiconductor Corporation. Dram nonvolatizer. 4,977,537, Cl. 364-900.000.

Diaz, Victor B.; Domanico, Ricardo H.; and Fussi, Fernando, to Aorca S.A. Process for controlled depolymerization of polysaccharides. 4,977,250, Cl. 536-21.000.

Dibble, Eric P.; and Knight, Alan D., to International Business Machines Corporation. Connector for connecting flexible film circuit carrier to board or card. 4,976,626, Cl. 439-67.000.

Diedrich, Dan D.: *See*—
Calvert, Barry G.; and Diedrich, Dan D., 4,976,797, Cl. 156-69.000.

Diehl GmbH & Co.: *See*—
Arnold, Werner; and Grundl, Peter, 4,977,393, Cl. 340-636.000.

Diener, JoAnn S.: *See*—
Wickersham, Wayne M.; Wickersham, Colleen A.; Diener, Kevin G.; Diener, JoAnn S.; and Skogler, Brian, 4,976,448, Cl. 280-47.200.

Diener, Kevin G.: *See*—
Wickersham, Wayne M.; Wickersham, Colleen A.; Diener, Kevin G.; Diener, JoAnn S.; and Skogler, Brian, 4,976,448, Cl. 280-47.200.

Diesel Kiki Co., Ltd.: *See*—
Nakajima, Nobuyuki; Inomata, Kenichi; Okada, Shigeru; and Eitai, Kazuo, 4,976,592, Cl. 417-295.000.

Dieter Wildfang KG: *See*—
Wildfang, Dieter; and Nehm, Holger, 4,976,283, Cl. 137-504.000.

Digital Equipment Corporation: *See*—
Rastegar, Joseph; and Valiton, Anne S., 4,977,498, Cl. 364-200.000.

Dilbarkanova, Rsai: *See*—
Gilmanov, Murat K.; Dilbarkanova, Rsai; and Sultanbaev, Beibyt E., 4,977,091, Cl. 435-271.000.

Diman, Charles; Marcus, David; Mitchell, Philip; and Sachs, Baruch, to Kendall Company, The. Point-of-use membrane filtration system. 4,976,876, Cl. 210-791.000.

Dinkelmann, Friedrich: *See*—
Konig, Herbert; and Dinkelmann, Friedrich, 4,977,331, Cl. 250-560.000.

Disimone, John, to Husky Injection Molding Systems, Ltd. Pivoting workpiece removal device. 4,976,603, Cl. 425-556.000.

Dix, Johannes P.; Hansen, Guenter; and Kast, Hellmut, to BASF Aktiengesellschaft. Preparation of concentrated solutions of cationic dyes as mono-carboxylates in glycol ether. 4,976,744, Cl. 8-527.000.

Dixon, David; and Surko, Walter E., Jr., to Yale Security Inc. Cylindrical lockset having quick mount means accommodating various thickness of doors. 4,976,480, Cl. 292-353.000.

Dixon, James S.: *See*—
Tomcufcik, Andrew S.; Dixon, James S.; Epstein, Joseph W.; Birnberg, Gary H.; and Fanshawe, William J., 4,977,189, Cl. 514-603.000.

Dixon, Kathy M. Method of breaking a nail biting habit. 4,976,275, Cl. 128-860.000.

Dixon, Larry D.: *See*—
Brown, Steve K.; Dixon, Larry D.; and Sharrow, Joseph F., 4,976,577, Cl. 411-271.000.

Djiauw, Lie K.: *See*—
Mitchell, Neil F.; and Djiauw, Lie K., 4,977,014, Cl. 428-220.000.

Dobler, Klaus; Hachtel, Hansjorg; and Zimmermann, Georg, to Robert Bosch GmbH. Process for contactless measurement of mechanical stress and device for carrying out the same. 4,976,160, Cl. 74-862.360.

Doby, William P.: *See*—
Munday, Mark L.; Doby, William P.; and Loose, Robert A., 4,977,368, Cl. 324-142.000.

Dobyns, Loren K.; Hanson, Gary S.; and Shrum, Durel B., to Atlantic Richfield Company. Dust collector housing with removable roof section. 4,976,756, Cl. 55-341.100.

Doddington, George R.; and Pawate, Basavaraj I., to Texas Instruments Incorporated. Efficient pruning algorithm for hidden markov model speech recognition. 4,977,598, Cl. 381-43.000.

Doi, Shuhei; and Ohnishi, Shunichi, to Mitsubishi Pertochemical Co., Ltd. Water-absorptive resin composition. 4,977,211, Cl. 525-54.310.

Domanico, Ricardo H.: *See*—
Diaz, Victor B.; Domanico, Ricardo H.; and Fussi, Fernando, 4,977,250, Cl. 536-21.000.

Domenget, Jean-Pierre; and Lorec, Gerard, to Electronique Serge Dassault. High frequency transformer with a printed circuit winding in particular for a very high voltage power supply. 4,977,491, Cl. 363-15.000.

Domer, Michel: *See*—
Simon, Jean-Michel; Taniere, Jacques; Ciolczyk, Jean-Pierre; and Domer, Michel, 4,976,412, Cl. 248-634.000.

Doolan, Martin P.; Duvall, Dale R.; Guetle, Norbert J., Jr.; and Rajagopol, Ganesh, to Pease Industries, Inc. Deadbolt assembly having selectable backset. 4,976,122, Cl. 70-134.000.

Dorband, Glen C.; Liland, Alfred; Menezes, Edgar; Steinheuser, Peter; Popadiuk, Nicholas M.; and Failla, Stephen J., to Ethicon, Inc. Method for manufacture of surgical fastening device. 4,976,909, Cl. 264-235.000.

Doteuchi, Masami: *See*—
Matsumoto, Saichi; Doteuchi, Masami; Mizui, Takuji; and Hirai, Kentaro, 4,977,170, Cl. 514-352.000.

Doty, Gerald A.; and Johnson, Eric T., to Occupany Safety Systems, Inc. Selective active overt comfort system. 4,976,474, Cl. 242-107.700.

Dougherty, Thomas J.: *See*—
Abujudom, David N., II; Dougherty, Thomas J.; Inkmann, Mark S.; Johnson, Richard T.; Karolek, Neil C.; and Saari, David W., 4,976,327, Cl. 180-68.200.

Dougherty, Thomas K.; Oldham, Susan L.; and Elias, William E., to Hughes Aircraft Company. Epoxy end-capped diolefin derivatives, polymers thereof, and processes for forming same. 4,977,220, Cl. 525-332.300.

Dow Brands Inc.: *See*—
Smith, David A.; Geiger, Herbert B.; and Dowell, Albert C., 4,976,673, Cl. 493-194.000.

Dow Chemical Company, The: *See*—
Beck, Henry N.; and Mahoney, Robert D., 4,976,901, Cl. 264-45.900.
Grinstead, Robert R.; and Paalman, H. Hunter, 4,976,866, Cl. 210-638.000.
Haberle, Norman; and Reutter, Anneliese, 4,977,183, Cl. 514-425.000.
King, Ian R., 4,976,946, Cl. 423-490.000.
Krupp, Stephen P.; and Gessner, Scott L., 4,977,023, Cl. 428-367.000.
Myers, Jimmy; and Wilson, Wilfred W., 4,977,156, Cl. 514-255.000.
Rao, Nancy A.; and Hickner, Richard A., 4,977,202, Cl. 523-414.000.
Simon, Jaime; Garlich, Joseph R.; Wilson, David A.; and McMillan, Kenneth, 4,976,950, Cl. 424-1.100.

Turner, James A.; Jacks, Wendy S.; and Zorner, Paul S., 4,976,772, Cl. 71-92.000.

Dowell, Albert C.: *See—*
Smith, David A.; Geiger, Herbert B.; and Dowell, Albert C., 4,976,673, Cl. 493-194.000.

Dowty, Earl L.: *See—*
Durrett, Michael G.; Helms, David A.; Hatton, Gregory J.; Dowty, Earl L.; Marrelli, John D.; Stafford, Joseph D.; and Stavish, David J., 4,977,377, Cl. 324-640.000.

Draftex Industries Limited: *See—*
Maass, Klaus P., 4,976,067, Cl. 49-377.000.

Dragerwerk Aktiengesellschaft: *See—*
Stock, Burkhard, 4,976,135, Cl. 73-23.200.

Drake, Craig D.: *See—*
Jessen, Ross A.; and Drake, Craig D., 4,976,391, Cl. 226-196.000.

Draper, David J. Internal combustion engine intake and exhaust valve control apparatus. 4,976,227, Cl. 123-80.00R.

Dravo Lime Company: *See—*
Lee, Yungli J.; Benson, Lewis B.; and College, John W., 4,976,937, Cl. 423-242.000.
Rathi, Ronald J.; and Benson, Lewis B., 4,976,936, Cl. 423-242.000.

Drazba, Martin: *See—*
Hahn, Paul; Reynolds, John; Tomlinson, Alan; O'Meara, Robert J.; and Drazba, Martin, 4,976,533, Cl. 351-160.00R.

Drejer, Jorgen: *See—*
Jacobsen, Poul; Nielsen, Flemming E.; Honore, Tage; and Drejer, Jorgen, 4,977,155, Cl. 514-250.000.

Dressman, Jennifer B.: *See—*
Meyer, James H.; Amidon, Gordon L.; and Dressman, Jennifer B., 4,976,949, Cl. 424-1.100.

Drewitz, Hans: *See—*
Hagin, Faust; and Drewitz, Hans, 4,976,664, Cl. 475-80.000.

Droho, Joseph: *See—*
Gibson, Ray G.; and Droho, Joseph, 4,977,346, Cl. 313-25.000.

Dufresne, Eric: *See—*
Sirat, Gabriel; Dufresne, Eric; Charlot, Didier; and Maruani, Alain, 4,976,504, Cl. 350-373.000.

Dufresne, Pierre; Franck, Jean-Pierre; Raatz, Francis; and Travers, Christine, to Institut Francais du Petrole. Mordenite-containing catalyst, its preparation and use for isomerizing cuts of high normal paraffin content. 4,977,121, Cl. 502-66.000.

Dufresne, Pierre: *See—*
Berrebi, Georges; and Dufresne, Pierre, 4,977,117, Cl. 502-26.000.

Duke University: *See—*
McPhail, Andrew T.; Spielvogel, Bernard F.; and Hall, Iris H., 4,977,268, Cl. 548-110.000.

Dunaway, Weyman H.; and Verbov, Lev F., to ECC America Inc. Method for forming aggregated kaolin pigment. 4,976,786, Cl. 106-416.000.

Dupont Canada Inc.: *See—*
Ascough, Michael R.; and Bueley, James A., 4,976,862, Cl. 210-656.000.

Du Pont de Nemours, E. I., and Company: *See—*
Brittelli, David R.; Corless, Peter F.; Gregory, Walter A.; and Park, Chung-Ho, 4,977,173, Cl. 514-376.000.
Debroy, Tapan K.; and Chung, Ding Y., 4,976,833, Cl. 204-181.700.
Elia, Andri E., 4,977,216, Cl. 525-183.000.
El-Sayed, Lyla M., 4,977,056, Cl. 430-115.000.
McConnell, Ronald F.; and Popper, Peter, 4,976,812, Cl. 156-148.000.
Squire, Edward N., 4,977,026, Cl. 428-422.000.
Squire, Edward N., 4,977,297, Cl. 174-258.000.

Durrett, Michael G.; Helms, David A.; Hatton, Gregory J.; Dowty, Earl L.; Marrelli, John D.; Stafford, Joseph D.; and Stavish, David J., to Texaco Inc. Microwave water cut monitor with temperature controlled test cell. 4,977,377, Cl. 324-640.000.

Durst, Klaus; and Reime, Gerd, to Nokia Unterhaltungselektronik. Remote control transmitter for emitting control commands. 4,977,404, Cl. 341-176.000.

Duthie, Robert E., Jr. Implant system. 4,976,739, Cl. 623-16.000.

Dutzmann, Stefan: *See—*
Wollweber, Detlef; Brandes, Wilhelm; and Dutzmann, Stefan, 4,977,182, Cl. 514-423.000.

Duvall, Dale R.: *See—*
Doolan, Martin P.; Duvall, Dale R.; Guetle, Norbert J., Jr.; and Rajagopol, Ganesh, 4,976,122, Cl. 70-134.000.

DWR Wind Technologies Inc.: *See—*
Johnston, J. Ford; Farone, William A.; and Mikhail, Amir, 4,976,587, Cl. 416-230.000.

Dyn, Nira: *See—*
Levy, Nessim I.; Dyn, Nira; and Ripps, Samuel, 4,976,035, Cl. 33-1.00A.

Dynamic Air, Inc.: *See—*
Steele, James R.; and Hardwicke, Redwell, 4,976,288, Cl. 138-120.000.

E. I Du Pont de Nemours and Company: *See—*
McConnell, Ronald F., 4,976,012, Cl. 19-299.000.
Squire, Edward N., 4,977,008, Cl. 428-35.700.
Squire, Edward N., 4,977,025, Cl. 428-421.000.

E. R. Squibb & Sons, Inc.: *See—*
Stein, Philip D.; and Hall, Steven E., 4,977,174, Cl. 514-382.000.
Sudilovsky, Abraham, 4,977,145, Cl. 514-91.000.

Easley, Madlyn; and Fisher, Robin. Folded prestrung shade and package. 4,976,301, Cl. 160-84.100.

Eastman Kodak Company: *See—*
Agostinelli, John A.; and Staudenmayer, William J., 4,976,877, Cl. 219-216.000.
Agreda, Victor H.; and Steinmetz, Guy R., 4,976,947, Cl. 423-502.000.
Arnold, Robert W.; and Maggiulli, Cataldo A., 4,977,269, Cl. 548-262.400.
Beato, Louis J., 4,977,602, Cl. 382-27.000.
Fagerburg, David R.; Watkins, Joseph J.; Lawrence, Paul B.; and Rule, Mark, 4,977,236, Cl. 528-226.000.
Florack, Christopher J.; and Fowlkes, William Y., 4,977,430, Cl. 355-274.000.
Granger, Edward M.; Hamilton, John F., Jr.; and Wash, Larry G., 4,977,458, Cl. 358-456.000.
Kaplan, Martin C., 4,977,521, Cl. 364-525.000.
Mohler, Robert D.; and Liao, James C., 4,977,523, Cl. 364-550.000.
Wash, Michael L.; and Whitfield, Arthur A., 4,977,419, Cl. 354-76.000.
Watkins, Joseph J.; Fagerburg, David R.; Lawrence, Paul B.; and Rule, Mark, 4,977,224, Cl. 525-471.000.

Eaton Corporation: *See—*
Bernstrom, Marvin L., 4,976,594, Cl. 418-61.300.
Goscenski, Edward J., Jr., 4,976,667, Cl. 475-86.000.
Phillips, Edward H.; and Johannsmeier, Karl-Heinz, 4,977,361, Cl. 318-640.000.

Eber, Daniele: *See—*
Denis, Jacques; Montagne, Xavier; Mulard, Philippe; and Eber, Daniele, 4,976,746, Cl. 44-330.000.

Eberhardt, H. Alfred; and Teske, Richard E., to Hale Fire Pump Company. Water driven fan for firefighting. 4,976,319, Cl. 169-54.000.

Eberhardt, Hans G.: *See—*
Pleschiutschnigg, Fritz-Peter; Parschat, Lothar; Burau, Armin; Rahmfeld, Werner; Moellers, Gerd; Ehrenberg, Hans-Juergen; and Eberhardt, Hans G., 4,976,306, Cl. 164-476.000.

Eberly, Paul E., to Exxon Research and Engineering Company. Cracking catalyst. 4,977,122, Cl. 502-69.000.

Ebinuma, Ryuichi; Chiba, Yuji; and Mizusawa, Nobutoshi, to Canon Kabushiki Kaisha. Ink-jet recording apparatus with mechanism for automatically regulating a recording head. 4,977,459, Cl. 358-296.000.

ECC America Inc.: *See—*
Dunaway, Weyman H.; and Verbov, Lev F., 4,976,786, Cl. 106-416.000.

ECIA - Equipments et Composants pour l'Industrie Automobile: *See—*
Martine, Robert; and Henigue, Christian, 4,976,801, Cl. 156-245.000.

Eckberg, Richard P., to General Electric Company. UV curable epoxy functional silicones. 4,977,198, Cl. 522-25.000.

Eckert, Armin: *See—*
Oerlemans, Peter; Marrett, Rolf; Eckert, Armin; and Altfeld, Klaus, 4,976,845, Cl. 208-39.000.

Eckert, Konrad, to Robert Bosch GmbH. Fuel injection device for internal combustion engines, in particular unit fuel injection. 4,976,244, Cl. 123-501.000.

Eckhardt, Wilfred O.; Williamson, Weldon S.; Hancock, Donald J.; and Robson, Ronald R., to Hughes Aircraft Company. Arrangement for shielding electronic components and providing power thereto. 4,977,329, Cl. 250-551.000.

Eckrich, Thomas M.; and Hoying, Richard C., to Eli Lilly and Company. DMF solvates of a β-lactam antibiotic. 4,977,257, Cl. 540-205.000.

Ecolab Inc.: *See—*
Decker, James D.; Burch, Wendell D.; Brady, Daniel F.; Hinzman, Gary W.; Kromrey, Edward P.; Sanville, Katherine M.; Southworth, Donald R.; Chace, Mark S.; and Peloquin, Perry M., 4,976,137, Cl. 73-53.000.

Edelstein, Fred; Liandris, Maria; and Brown, Richard F., to Grumman Aerospace Corporation. Liquid line non-condensible gas trap. 4,976,754, Cl. 55-159.000.

Edtech Company: *See—*
Schwartz, Edward M.; and Everman, Wilburn D., 4,976,407, Cl. 248-118.300.

Edwards, David, Jr.: *See—*
Ward, Billy W.; Edwards, David, Jr.; and Casella, Robert A., 4,976,843, Cl. 204-298.360.

Edwards, Keith R., to Abex Corporation. Method of bonding friction material to plated substrates. 4,976,800, Cl. 156-151.000.

Efamol Holdings PLC: *See—*
Horrobin, David F., 4,977,187, Cl. 514-560.000.

EHL Development Inc.: *See—*
Levy, Edward H., 4,975,999, Cl. 15-210.00R.

Ehrenberg, Hans-Juergen: *See—*
Pleschiutschnigg, Fritz-Peter; Parschat, Lothar; Burau, Armin; Rahmfeld, Werner; Moellers, Gerd; Ehrenberg, Hans-Juergen; and Eberhardt, Hans G., 4,976,306, Cl. 164-476.000.

Eigyo, Masami: *See—*
Matsumura, Hiromu; Yano, Toshisada; Matsushita, Akira; and Eigyo, Masami, 4,977,167, Cl. 514-326.000.

Eipper, Gunter: *See—*
Meyer, Joachim; Buehler, Wolfgang; Grimmer, Johannes; Eipper, Gunter; Kiefer, Hans; and Martin, Christoph, 4,977,190, Cl. 514-951.000.

Eisai Co., Ltd.: *See—*
Oinuma, Hitoshi; Yamanaka, Motosuke; Miyake, Kazutoshi; Hoshiko, Tomonori; Minami, Norio; and Shoji, Tadao, 4,977,165, Cl. 514-318.000.

Eisenberger, Benjamin; and Roussel, Pierre, to Jaeger. Tachometer device having limiting means for limiting frequency variations. 4,977,372, Cl. 324-166.000.
Eisner, Mark R.; and Becker, Charlton D., to Steri-Shield Products, Inc. Dental tray handle shield or prophylactic. 4,976,616, Cl. 433-77.000.
Eitai, Kazuo: *See*—
Nakajima, Nobuyuki; Inomata, Kenichi; Okada, Shigeru; and Eitai, Kazuo, 4,976,592, Cl. 417-295.000.
Ejlersen, Henning M.; and Tullin, Flemming, to Nordisk Gentofte A/S. Injection apparatus. 4,976,701, Cl. 604-192.000.
Ekanayake, Dulip: *See*—
Davila, Dan I.; Midkiff, John A.; and Ekanayake, Dulip, 4,976,510, Cl. 350-96.200.
Ekstrom Industries, Inc.: *See*—
Langdon, Albert K.; Learmont, Robert O.; Robinson, Darrell; Goozen, Robert; Lewis, Michael; Williams, John; Pruehs, Allen V.; and Shincovich, John T., 4,977,482, Cl. 361-366.000.
Electro Chemical Engineering GmbH: *See*—
Schmeling, Edith L.; Roschenbleck, Benno; and Weidemann, Michael H., 4,976,830, Cl. 204-58.400.
Electronic Publishing Resources, Inc.: *See*—
Shear, Victor H., 4,977,594, Cl. 380-4.000.
Electronique Serge Dassault: *See*—
Domenget, Jean-Pierre; and Lorec, Gerard, 4,977,491, Cl. 363-15.000.
Eli, Ilana: *See*—
Rosenberg, Melvyn; Eli, Ilana; and Weiss, Ervin, 4,976,951, Cl. 424-7.100.
Eli Lilly and Company: *See*—
Boeck, LaVerne D., 4,977,083, Cl. 435-71.300.
Eckrich, Thomas M.; and Hoying, Richard C., 4,977,257, Cl. 540-205.000.
Ferguson, Thomas H.; Harrison, Roger G.; and Moore, David L., 4,977,140, Cl. 514-12.000.
Huser, Diane L.; and Schaus, John M., 4,977,160, Cl. 514-293.000.
Kovacevic, Steven; Miller, James R.; Veal, Loraine E.; and Wood, John S., 4,977,089, Cl. 435-252.310.
Schaus, John M., 4,977,149, Cl. 514-210.000.
Elia, Andri E., to Du Pont de Nemours, E. I., and Company. Toughened nylons characterized by low mold deposit. 4,977,216, Cl. 525-183.000.
Elias, William E.: *See*—
Dougherty, Thomas K.; Oldham, Susan L.; and Elias, William E., 4,977,220, Cl. 525-332.300.
Ellefson, Laurence M. Mobile tool chest with horizontal pivotal trays. 4,976,450, Cl. 280-79.110.
Ellestad, George A.: *See*—
McGahren, William J.; and Ellestad, George A., 4,977,143, Cl. 514-25.000.
Elliott Turbomachinery Co., Inc.: *See*—
Heckel, Bruce G., 4,976,588, Cl. 417-20.000.
Ellis, John; Nicholson, John W.; and Wilson, Alan D. Coating substrates. 4,976,829, Cl. 204-38.700.
Ellis, Robert H.: *See*—
Ginzburg, Vladimir B.; and Ellis, Robert H., 4,976,158, Cl. 73-862.070.
El-Sayed, Lyla M., to Du Pont de Nemours, E. I., and Company. Alkylhydroxy benzylpolyamine as adjuvant for electrostatic liquid developers. 4,977,056, Cl. 430-115.000.
Elvander, Hans I.; and Malmstrom, Rolf E., to A. Ahlstrom Corporation. Method for reduction of material containing metal oxide using a fluidized bed reactor and flame chamber. 4,976,776, Cl. 75-483.000.
Ema, Taiji, to Fujitsu Limited. Method of producing layer structure of a memory cell for a dynamic random access memory device. 4,977,102, Cl. 437-52.000.
Emerson Electric Co.: *See*—
Obradovic, Ilija J., 4,977,344, Cl. 310-217.000.
Emery, J. Donald: *See*—
Church, John; Oelschlaegel, Victor R.; and Emery, J. Donald, 4,976,285, Cl. 137-588.000.
Enari, Masahiko; Shimokoriyama, Makoto; and Fujii, Akio, to Canon Kabushiki Kaisha. Sampled-value code processing device. 4,977,452, Cl. 358-138.000.
Endo, Ken: *See*—
Yamada, Hitoshi; Endo, Ken; and Kotani, Kikuo, 4,977,139, Cl. 514-11.000.
Endo, Tsunehiro: *See*—
Tanaka, Naoyuki; Nakamura, Yozo; Arai, Akira; Nakamura, Mitsuru; Endo, Tsunehiro; and Kadomukai, Yuzo, 4,977,508, Cl. 364-431.080.
Endress u. Hauser GmbH u. Co.: *See*—
Schneider, Georg; and Braun, Hans, 4,976,154, Cl. 73-861.060.
Energy Research Corporation: *See*—
Bilhorn, John M., 4,976,904, Cl. 264-104.000.
Engel, Joachim: *See*—
Sachse, Bruno; Weiskopf, Hubert; Engel, Joachim; and Zintel, Jakob, 4,976,914, Cl. 376-391.000.
Engelskirchen, Konard: *See*—
Wisotzki, Klaus-Dieter; Schumann, Klaus; Engelskirchen, Konard; and Hase, Brigitte, 4,976,885, Cl. 252-174.170.
Engineered Instruments, Inc.: *See*—
Mraz, Dennis Z.; and Mahyera, Anil, 4,976,571, Cl. 405-261.000.
Enichem Sintesi S.p.A.: *See*—
Greco, Alberto; Busetto, Carlo; Cassar, Luigi; and Neri, Carlo, 4,977,259, Cl. 544-69.000.
Enitricerche S.p.A.: *See*—
Baradel, Agostino; Della Penna, Gino; Gulinelli, Silvio; Valdiserri, Mario; and Robertiello, Andrea, 4,976,864, Cl. 210-610.000.
Nuzzolo, Carlo A.; Bernardi, Adriano; Pessi, Antonello; and Verdini, Antonio S., 4,977,079, Cl. 435-7.000.
Enomoto, Norihide: *See*—
Tsunoda, Takeo; Takeo, Setsu; Nobusawa, Tatsuya; Enomoto, Norihide; Takahashi, Hiroyasu; Watanabe, Minoru; Sasaki, Yutaka; and Tanaka, Kunihiro, 4,976,941, Cl. 423-247.000.
Enomoto, Tatsuya: *See*—
Sakamura, Ken; Shimizu, Toru; Iwata, Shunichi; and Enomoto, Tatsuya, 4,977,497, Cl. 364-200.000.
Enosawa, Yoshio: *See*—
Tsuchiya, Kazuhisa; Enosawa, Yoshio; and Kitajima, Motohiro, 4,977,436, Cl. 357-236.000.
Envirodynamics Limited: *See*—
Fowler, James A., 4,976,842, Cl. 204-252.000.
Epstein, Joseph W.: *See*—
Tomcufcik, Andrew S.; Dixon, James S.; Epstein, Joseph W.; Birnberg, Gary H.; and Fanshawe, William J., 4,977,189, Cl. 514-603.000.
Equipement Industriel Normand: *See*—
Coquerel, Michel J. L., 4,977,391, Cl. 340-522.000.
Erard, Jose: *See*—
Ceron, Daniel; Lodomez, Christian; Hano, Paul; and Erard, Jose, 4,976,123, Cl. 70-369.000.
Erdmann, Hartmut: *See*—
Ammende, Sonya; Erdmann, Hartmut; Etzkorn, Heinz-Werner; and Zucholl, Klaus, 4,976,991, Cl. 427-125.000.
Ergenics, Inc.: *See*—
Travis, Jonathan A.; and Woodard, Winfred L., III, 4,977,035, Cl. 428-550.000.
Erhardt, Manfred; and Loos, Herbert, to Carl Hurth Maschinen- und Zahnradfabrik GmbH & Co. Scanner head for a tooth-flank scanning device. 4,976,044, Cl. 33-501.140.
Erithglen Limited: *See*—
Piggin, Peter R., 4,976,209, Cl. 110-234.000.
Ernest, Michael V., to W. P. Grace & Co.-Conn. Auto exhaust catalyst composition having low H_2S emissions and method of making the catalyst. 4,977,129, Cl. 502-330.000.
Erno Raumfahrttechnik GmbH: *See*—
Bruhn, Hansdieter, 4,976,398, Cl. 244-135.00R.
Ersteniuk, Stephen R. Protective helmet for firefighters. 4,975,980, Cl. 2-6.000.
ESA, Inc.: *See*—
Matson, Wayne R., 4,976,994, Cl. 427-230.000.
Esakoff, Gregory F.: *See*—
Cunningham, David W.; and Esakoff, Gregory F., 4,977,484, Cl. 361-429.000.
Esquivel, Agerico L.; and Mitchell, Allan T. Buried multilevel interconnect system. 4,977,439, Cl. 357-49.000.
Essilor International, Cie Generale d'Optique: *See*—
Miege, Christian; Monteil, Pierre; and Obrecht, Gerard, 4,976,534, Cl. 351-161.000.
ESTA Apparatebau GmbH & Co. KG: *See*—
Kulitz, Guenter, 4,976,850, Cl. 210-104.000.
Etat Francais (Centre National d'Etudes des Telecommunications): *See*—
Sirat, Gabriel; Dufresne, Eric; Charlot, Didier; and Maruani, Alain, 4,976,504, Cl. 350-373.000.
Ethicon, Inc.: *See*—
Dorband, Glen C.; Liland, Alfred; Menezes, Edgar; Steinheuser, Peter; Popadiuk, Nicholas M.; and Failla, Stephen J., 4,976,909, Cl. 264-235.000.
Failla, Stephen J., 4,976,722, Cl. 606-157.000.
Ethyl Corporation: *See*—
Laurent, Sebastian M.; and Sanders, Robert N., 4,976,971, Cl. 426-2.000.
Mungall, Thomas G.; and Moehle, William E., 4,976,933, Cl. 423-210.000.
Smith, R. Scott, 4,977,124, Cl. 502-174.000.
ETI-TEC Maschinenbau GmbH: *See*—
Tomashauer, Josef; Zodrow, Rudolf; and Buchholz, Rainer, 4,976,803, Cl. 156-297.000.
Etzkorn, Heinz-Werner: *See*—
Ammende, Sonya; Erdmann, Hartmut; Etzkorn, Heinz-Werner; and Zucholl, Klaus, 4,976,991, Cl. 427-125.000.
Euro-Locks, S.A.-N.V.: *See*—
Ceron, Daniel; Lodomez, Christian; Hano, Paul; and Erard, Jose, 4,976,123, Cl. 70-369.000.
Europeenne de Retraitement de Catalyseurs: *See*—
Berrebi, Georges; and Dufresne, Pierre, 4,977,117, Cl. 502-26.000.
Evans, Alan G.; and Main, Ewan J. Mattress. 4,975,996, Cl. 5-464.000.
Evans, Allan J.: *See*—
Beran, Mark A.; and Evans, Allan J., 4,976,065, Cl. 49-43.000.
Evans, Daniel D., Jr.: *See*—
Gabaldon, John B.; and Evans, Daniel D., Jr., 4,977,494, Cl. 364-167.010.
Evans, Edwin R., to General Electric Company. Catalyst for producing fluorosilicone polymers. 4,977,289, Cl. 556-454.000.
Evans, Edwin R.; and Maitoza, Paul, to General Electric Company. Polar aprotic catalysts for formation of fluorosilicone fluids. 4,977,290, Cl. 556-459.000.
Evans, Gary A.: *See*—
Carlson, Nils W.; Evans, Gary A.; and Kaiser, Charlie J., 4,976,539, Cl. 356-5.000.

Everest Medical Corporation: *See—*
Parins, David J.; Rydell, Mark A.; and Stasz, Peter, 4,976,711, Cl. 606-48.000.

Everett, Robert A. Shirt collar stay system. 4,975,983, Cl. 2-60.000.

Everman, Wilburn D.: *See—*
Schwartz, Edward M.; and Everman, Wilburn D., 4,976,407, Cl. 248-118.300.

Everts, Robert G., to Inertia Dynamics Corporation. Brake system for rotary cutters and trimmers. 4,976,093, Cl. 56-11.300.

Every, Peter: *See—*
Sivulka, Gerald M.; and Every, Peter, 4,976,501, Cl. 303-113.000.

Executone Information Systems, Inc.: *See—*
Milovancevic, Slavko, 4,977,590, Cl. 379-395.000.

Expert Explosives (Proprietary) Limited: *See—*
Beukes, Christo A.; Patz, Vivian E.; and Moraitis, Thrasyvoulas, 4,976,199, Cl. 102-200.000.

Exxon Chemical Patents, Inc.: *See—*
Martella, David J.; and Jaruzelski, John J., 4,976,882, Cl. 252-48.200.

Exxon Research and Engineering Company: *See—*
Eberly, Paul E., 4,977,122, Cl 502-69.000.
Mauldin, Charles H.; and Riley, Kenneth L., 4,977,126, Cl. 502-242.000.
Sartori, Guido; and Ho, W. S. Winston, 4,976,868, Cl. 210-640.000.

Fabre, Frederic; Tognet, Jean-Paul; and Magnier, Claude, to Rhone-Poulenc Specialites Chimiques. Processing of rare earth ores. 4,976,939, Cl. 423-21.100.

FAG Kugelfischer Georg Schafer (KGaA): *See—*
Scharting, Gunter; and Ortmann, Wolfgang, 4,976,551, Cl. 384-448.000.

Fagerburg, David R.; Watkins, Joseph J.; Lawrence, Paul B.; and Rule, Mark, to Eastman Kodak Company. Terminated copoly(arylene sulfide) of low molecular weight. 4,977,236, Cl. 528-226.000.

Fagerburg, David R.: *See—*
Watkins, Joseph J.; Fagerburg, David R.; Lawrence, Paul B.; and Rule, Mark, 4,977,224, Cl. 525-471.000.

Faghri, Amir, to Wright State University. Thermal energy storage heat exchanger. 4,976,308, Cl. 165-10.000.

Fahnestock, Stephen R.; Lee, Timothy; and Wroble, Marie H., to Genex Corporation. Immobilized protein G variants and the use thereof. 4,977,247, Cl. 530-387.000.

Failla, Stephen J., to Ethicon, Inc. Surgical hemostatic clips. 4,976,722, Cl. 606-157.000.

Failla, Stephen J.: *See—*
Dorband, Glen C.; Liland, Alfred; Menezes, Edgar; Steinheuser, Peter; Popadiuk, Nicholas M.; and Failla, Stephen J., 4,976,909, Cl. 264-235.000.

Fairchild Space and Defense Corporation: *See—*
Bay, Peter M.; Colaluca, Carmine J., Jr.; and Pataki, Steven, 4,976,399, Cl. 244-161.000.

Faith, William B. Arcade-type prize dispensing machine. 4,976,440, Cl. 273-362.000.

Faiveiey Enterprises: *See—*
Crozat, Georges; and Lebrun, Michel, 4,976,117, Cl. 62-480.000.

Falcial, Riccardo; Scheggi, Annamaria V.; Baldini, Francesco; and Bechi, Paolo, to Consiglio Nazionale delle Richerche. Method of detecting enterogastric reflux. 4,976,265, Cl. 128-634.000.

Fanshawe, William J.: *See—*
Tomcufcik, Andrew S.; Dixon, James S.; Epstein, Joseph W.; Birnberg, Gary H.; and Fanshawe, William J., 4,977,189, Cl. 514-603.000.

Fantone, Stephen D.: *See—*
Bowen, Mark S.; Fantone, Stephen D.; Miller, Bruce E.; and Thompson, Duane T., 4,977,325, Cl. 250-461.200.

Fanuc Ltd.: *See—*
Karube, Norio, 4,977,574, Cl. 372-93.000.
Yamazaki, Seiji, 4,976,602, Cl. 425-188.000.

Fardeau, Michel G. J.; and Adamolle, Bruno J. M., to Bertin & Cie. Binary quantification of an image having multiple levels of greys. 4,977,605, Cl. 382-51.000.

Farnum, Charles L.: *See—*
Correa, Jose L.; Stumpf, Robert C.; Farnum, Charles L.; and Roos, Leo, 4,976,817, Cl. 156-555.000.

Farone, William A.: *See—*
Johnston, J. Ford; Farone, William A.; and Mikhail, Amir, 4,976,587, Cl. 416-230.000.

Fasen, Kenneth R.: *See—*
Kutz, Donald A.; and Fasen, Kenneth R., 4,977,610, Cl. 455-120.000.

Fatia Industrial Co., Ltd.: *See—*
Fung, Shiu P., 4,977,489, Cl. 362-184.000.

Favre, Christian: *See—*
Guichard, Jean; and Favre, Christian, 4,976,499, Cl. 303-13.000.

Fedder, James L., to AMP Incorporated. Modules for cable assemblies. 4,976,628, Cl. 439-101.000.

Feicho, Lutz: *See—*
Block, Juergen; Feicho, Lutz; Sobe, Alwin; and Wischniewski, Martin, 4,976,965, Cl. 424-456.000.

Feitzelmayer, Ernst, to MTU Motoren- und Turbinen Union Muenchen GmbH. Method for electrically and mechanically connecting the ends of two jacketed electrical conductors to each other. 4,976,796, Cl. 156-49.000.

Felix Schoeller Jr. GmbH & Co. KG: *See—*
Westfal, Horst; and Ruben, F. B., 4,977,065, Cl. 430-271.000.

Fellingham, George: *See—*
Bibl, Andreas; and Fellingham, George, 4,977,416, Cl. 346-155.000.

Felter, Richard E.; Markley, Dean A.; and Musser, Deborah L., to Armstrong World Industries, Inc. Static dissipative vinyl sheet and film. 4,976,890, Cl. 252-511.000.

Ferguson, John H.: *See—*
Snyder, Robert F.; Ferguson, John H.; Meisterling, Jesse R.; and Fishman, David S., 4,976,159, Cl. 73-862.210.

Ferguson, Thomas H.; Harrison, Roger G.; and Moore, David L., to Eli Lilly and Company. Injectable sustained release formulation. 4,977,140, Cl. 514-12.000.

Fermenta ASC Corporation: *See—*
Barnes, Keith D.; Hotzman, Frederick W.; Limpel, Lawrence E.; and Magee, Thomas A., 4,976,770, Cl. 71-88.000.

Ferrier, Donald R.: *See—*
Bach, Wolf; Ferrier, Donald R.; Kukanskis, Peter E.; Williams, Ann S.; and Senechal, Mary J., 4,976,990, Cl. 427-98.000.

Feuling, James J. Curved intake duct having improved flow characteristics. 4,976,231, Cl. 123-188.00M.

Fiat Aviazione S.p.A.: *See—*
Cappellato, Bruno, 4,976,335, Cl. 184-6.400.

Fields, Randy R.: *See—*
Shaw, Bon F.; Bond, Gary M.; and Fields, Randy R., 4,977,527, Cl. 364-571.030.

Fifth Generation Technology (Manufacturing) Ltd.: *See—*
Davies, John H., 4,977,490, Cl. 362-221.000.

Fike Corporation: *See—*
Shaw, Bon F.; Bond, Gary M.; and Fields, Randy R., 4,977,527, Cl. 364-571.030.

Finch Conservatories Limited: *See—*
Brown, Ronald L., 4,976,076, Cl. 52-90.000.

Fisher Controls International, Inc.: *See—*
Fitzgerald, William V., 4,976,144, Cl. 73-168.000.

Fisher, Robin: *See—*
Easley, Madlyn; and Fisher, Robin, 4,976,301, Cl. 160-84.100.

Fishman, David S.: *See—*
Snyder, Robert F.; Ferguson, John H.; Meisterling, Jesse R.; and Fishman, David S., 4,976,159, Cl. 73-862.210.

Fisk, Zachary: *See—*
Migliori, Albert; Visscher, William M.; and Fisk, Zachary, 4,976,148, Cl. 73-579.000.

Fitzgerald, William V., to Fisher Controls International, Inc. Diagnostic apparatus and method for fluid control valves. 4,976,144, Cl. 73-168.000.

Flabbi, Luciano: *See—*
Bargigia, Gianangelo; Re, Alberto; Corbelli, Luigi; Johns, Ken; Flabbi, Luciano; and Srinivasan, Padmanabhan, 4,977,222, Cl. 525-359.300.

Flatley, James P.; and Shajenko, Peter, to United States of America, Navy. Signal stabilization in optical hydrophones. 4,977,546, Cl. 367-140.000.

Flenker, Helmut: *See—*
Hagin, Faust; and Flenker, Helmut, 4,976,665, Cl. 475-80.000.

Flensburg, Carl G. A.; and Isaksson, Rolf H. V. Method for gathering signatures and a gathering machine for working the method. 4,976,420, Cl. 270-54.000.

Flodins Filter AB: *See—*
Siversson, Per-Erik, 4,976,677, Cl. 493-413.000.

Florack, Christopher J.; and Fowlkes, William Y., to Eastman Kodak Company. Transfer roller power supply. 4,977,430, Cl. 355-274.000.

Flytzani-Stephanopoulos, Maria; and Jothimurugesan, Kandaswami, to Massachusetts Institute of Technology. Preparation of extrusions of bulk mixed oxide compounds with high macroporosity and mechanical strength. 4,977,123, Cl. 502-84.000.

Focke & Co. (GmbH & Co.): *See—*
Focke, Heinz, 4,976,584, Cl. 414-789.600.

Focke, Heinz, to Focke & Co. (GmbH & Co.). Apparatus for loading cartons onto pallets. 4,976,584, Cl. 414-789.600.

Fogarty, Thomas J.: *See—*
Chin, Albert K.; and Fogarty, Thomas J., 4,976,725, Cl. 606-192.000.

Foggin, Richard G.: *See—*
Smith, Hylton H.; and Foggin, Richard G., 4,977,006, Cl. 428-42.000.

Folk, Craig L.: *See—*
Sawhney, A. Paul S.; Folk, Craig L.; and Robert, Kearny Q., 4,976,096, Cl. 57-12.000.

Foltz, Donald R., to Hankison Corporation. Filter. 4,976,759, Cl. 55-487.000.

Fondis, S.A.: *See—*
Richard, Robert; and Prado, Gilles, 4,976,207, Cl. 110-214.000.

Fonneland, Nils J.: *See—*
Brandstetter, Robert W.; and Fonneland, Nils J., 4,976,520, Cl. 350-384.000.

Fonsalas, Frederic; Hayet, Pascal; Lejard, Jean-Yves; and Le Queau, Marcel, to U.S. Philips Corporation. System and apparatus for transmitting and receiving high definition television pictures over a channel having a comparatively narrow passband. 4,977,453, Cl. 358-138.000.

Ford Motor Company: *See—*
Anderson, James E.; Markovac, Vlado; and Troyk, Philip R., 4,977,009, Cl. 429-76.000.
Gentle, Derek F., 4,976,490, Cl. 296-183.000.

Ford, Warren T.: *See—*
Berlin, Kenneth D.; Ford, Warren T.; Rajadhyaksha, Shirish N.; Gale, Jonathan B.; and Spruce, Lyle W., 4,977,276, Cl. 549-58.000.

Formula Systems Limited: *See*—
Trett, John, 4,976,337, Cl. 187-51.000.
Fornof, James D., to Westinghouse Electric Corp. Reactor coolant pump auxiliary seal for reactor coolant system vacuum degasification. 4,976,446, Cl. 277-198.000.
Foseco International Limited: *See*—
Barker, Sidney A.; Baggett, Neil; Stevenson, John; George, Raymond D.; De Courcy, David R.; Hammond, Timothy; and Bradley, Martin, 4,977,209, Cl. 524-594.000.
Foster, Friedrich; Brieke, Hans-Gunter; and Marsch, Hans-Dieter. Device for performing exothermic catalytic gas reactions for the synthesis of ammonia or methanol. 4,976,928, Cl. 422-148.000.
Foster, Howard J.: *See*—
Gordon, Ian A.; and Foster, Howard J., 4,976,411, Cl. 248-524.000.
Fouche, Claude, to S.A.: Societe Europeenne de Propulsion. Workpiece-carrier spindle assembly having magnetic bearings, and a device implementing such an assembly for a very high precision machine tool. 4,976,177, Cl. 82-147.000.
Fowler, James A., to Envirodynamics Limited. Oxidant generator. 4,976,842, Cl. 204-252.000.
Fowlkes, William Y.: *See*—
Florack, Christopher J.; and Fowlkes, William Y., 4,977,430, Cl. 355-274.000.
Fox, Ian F.: *See*—
Gatley, Richard; Fox, Ian F.; and Neale, Greville T., 4,976,910, Cl. 264-278.000.
Fraissenet, Bruno: *See*—
Cartry, Jean P.; and Fraissenet, Bruno, 4,976,027, Cl. 29-727.000.
Framatome: *See*—
Cartry, Jean P.; and Fraissenet, Bruno, 4,976,027, Cl. 29-727.000.
Francis, John E.: *See*—
Fujimoto, Roger A.; Francis, John E.; and Hutchison, Alan J., 4,977,144, Cl. 514-46.000.
Franck, Jean-Pierre: *See*—
Dufresne, Pierre; Franck, Jean-Pierre; Raatz, Francis; and Travers, Christine, 4,977,121, Cl. 502-66.000.
Franetzki, Manfred; Funke, Helmut; and Schweiker, Eugen, to Siemens Aktiengesellschaft. Medical catheter for intravascular long-term infusion of medication with polysiloxane hydrogel coating. 4,976,703, Cl. 604-247.000.
Frangakis, Crist J.: *See*—
Berger, Henry, Jr.; and Frangakis, Crist J., 4,976,959, Cl. 424-94.200.
Frank, Barry M. Clacker apparatus. 4,976,651, Cl. 446-421.000.
Frankila, John W. Vehicle headrest post guide. 4,976,493, Cl. 297-410.000.
Frano, Frank, to Illinois Tool Works, Inc. Adjustable waistband assembly. 4,976,017, Cl. 24-585.000.
Franz Pohl Metall- und Kunststoffwarenfabrik GmbH: *See*—
von Schuckmann, Alfred, 4,976,380, Cl. 222-103.000.
Frehel, Daniel: *See*—
Bernat, Andre ; Delabassee, Denis; Frehel, Daniel; Maffrand, Jean-Pierre; and Vallee, Eric, 4,977,168, Cl. 514-330.000.
Frenzelit-Werke GmbH & Co. KG: *See*—
Bauer, Gerhard; and Rodel, Reinhard, 4,977,205, Cl. 524-496.000.
Frey, Otto; Semlitsch, Manfred; and Weber, Heinz, to Sulzer Brothers Limited. Porous metal overlay for an implant surface. 4,976,738, Cl. 623-16.000.
Frey, Timothy J.: *See*—
Meyers, Peter V.; Liu, Chung-Heng; and Frey, Timothy J., 4,977,097, Cl. 437-4.000.
Freyssinet International (STUP): *See*—
Jartoux, Pierre, 4,976,078, Cl. 52-223.00L.
Friedel, Thomas: *See*—
Hausermann, Walter; Maurer, Max; and Friedel, Thomas, 4,977,169, Cl. 514-346.000.
Friendship, Kenneth F. M.: *See*—
Krishnakumar, Suppayan M.; Friendship, Kenneth F. M.; Mahajan, Gautam K.; and Pocock, John F. E., 4,977,005, Cl. 428-36.920.
Frijlink, Peter, to U.S. Philips Corporation. Epitaxy reactor having an improved gas collector. 4,976,217, Cl. 118-733.000.
Frosini, Franco: *See*—
Mezzedimi, Vasco; and Frosini, Franco, 4,976,585, Cl. 415-118.000.
Fry, Michael: *See*—
Hall, Charles; and Fry, Michael, 4,976,307, Cl. 165-76.000.
Frymaster Corporation, The: *See*—
Grob, James T.; and Caron, Richard N., 4,976,609, Cl. 431-326.000.
Fuel Tech, Inc.: *See*—
Grimard, Francois X., 4,976,607, Cl. 431-174.000.
Fuji Electric Co., Ltd.: *See*—
Nagumo, Mutsumi; Nakagawa, Wataru; and Tsuruoka, Michihiko, 4,976,153, Cl. 73-861.030.
Fuji Jukogyo Kabushiki Kaisha: *See*—
Matsumoto, Renpei, 4,976,330, Cl. 180-197.000.
Miyama, Shuji; and Ohkumo, Hiroya, 4,976,139, Cl. 73-117.300.
Nakao, Akihiro, 4,976,477, Cl. 292-201.000.
Fuji, Kazuo, to Mita Industrial Co., Ltd. Fixing apparatus and method of controlling temperature of the same. 4,977,431, Cl. 355-289.000.
Fuji Koki Mfg. Co., Ltd.: *See*—
Nishihara, Toshihiko, 4,977,480, Cl. 361-283.000.
Fuji Photo Film Co., Ltd.: *See*—
Agano, Toshitaka; and Saotome, Shigeru, 4,977,322, Cl. 250-327.200.
Akao, Mutsuo, 4,977,033, Cl. 428-516.000.
Aonuma, Masashi; Okita, Tsutomu; Hashimoto, Hiroshi; and Kobayashi, Kingo, 4,976,989, Cl. 427-48.000.
Arakawa, Satoshi; Nonomura, Masamitu; Ogoda, Makoto; Torii, Shumpeita; and Kohda, Katsuhiro, 4,977,327, Cl. 250-484.100.
Chino, Naoyoshi; Hiraki, Yasuhito; and Sato, Tsunehiko, 4,976,992, Cl. 427-131.000.
Funahashi, Takeshi, 4,977,504, Cl. 364-413.130.
Higuchi, Noboru; Kobayashi, Chuzo; Ichikawa, Yasunori; Matsui, Keizo; and Yamaguchi, Shigeru, 4,976,377, Cl. 222-55.000.
Horikawa, Kazuo; Okada, Kouichi; and Miyagawa, Ichirou, 4,976,527, Cl. 350-588.000.
Ichikawa, Yasunori; Yamaguchi, Shigeru; Ohnishi, Hiroshi; Kojima, Akira; and Kato, Akira, 4,976,404, Cl. 251-121.000.
Ihama, Mikio; Kume, Yuji; Tamoto, Koji; Takehara, Hiroshi; and Arai, Masao, 4,977,075, Cl. 430-567.000.
Ishikawa, Shunichi; and Nakamura, Koichi, 4,977,057, Cl. 430-138.000.
Ishikawa, Yoshihiro, 4,976,523, Cl. 350-429.000.
Ishizuka, Seiji, 4,976,999, Cl. 427-420.000.
Kanetake, Satoshi; Hashimoto, Shinichi; Ono, Shigetoshi; and Naoi, Takashi, 4,977,071, Cl. 430-534.000.
Kato, Eiichi, 4,977,049, Cl. 430-49.000.
Kato, Eiichi; Ishii, Kazuo; and Hattori, Hideyuki, 4,977,055, Cl. 430-114.000.
Kotani, Takaaki; and Takada, Seiji, 4,976,537, Cl. 356-1.000.
Mikami, Takeshi, 4,977,052, Cl. 430-98.000.
Mori, Nobufumi; and Oikawa, Tetsuo, 4,977,321, Cl. 250-311.000.
Nagashima, Yasuo; Soeda, Haruo; Sato, Masamichi; and Kubo, Takashi, 4,976,020, Cl. 29-90.010.
Nakata, Tomohiro, 4,977,466, Cl. 360-73.080.
Ohba, Hisao; Oda, Kazutaka; Sakaki, Hirokazu; Shirai, Akira; and Ohashi, Azusa, 4,976,198, Cl. 101-459.000.
Ohno, Shigeru; Kitatani, Katsuji; Makino, Naonori; Hoshi, Satoshi; and Sato, Hideo, 4,977,051, Cl. 430-58.000.
Oizhi, Kengo; and Odate, Seizi, 4,977,474, Cl. 360-132.000.
Okazaki, Masaki; Yamamuro, Kiyohiko; Koizumi, Shigeo; and Shiba, Keisuke, 4,977,076, Cl. 430-583.000.
Saitou, Mitsuo; and Suga, Yoichi, 4,977,074, Cl. 430-567.000.
Suganuma, Yoshimi, 4,977,061, Cl. 430-203.000.
Takase, Haruo; Uenaka, Kazushige; Abf, Akira; and Fujita, Yoshihiro, 4,976,870, Cl. 210-668.000.
Yagihara, Morio; Okada, Hisashi; Katoh, Kazunobu; and Inoue, Nobuaki, 4,977,062, Cl. 430-264.000.
Fuji Photo Optical Co., Ltd.: *See*—
Matsumura, Takeshi; and Koizumi, Noboru, 4,976,525, Cl. 350-432.000.
Fuji Xerox Co., Ltd.: *See*—
Akutsu, Eiichi; Soga, Hiroh; and Ando, Shigehito, 4,976,986, Cl. 427-27.000.
Fujii, Akio: *See*—
Enari, Masahiko; Shimokoriyama, Makoto; and Fujii, Akio, 4,977,452, Cl. 358-138.000.
Fujii, Takabumi: *See*—
Kadouchi, Eiji; Matsumoto, Isao; Fujii, Takabumi; Sato, Hiroshi; and Hino, Takashi, 4,977,043, Cl. 429-54.000.
Fujikawa, Susumu: *See*—
Tanokura, Nobukazu; and Fujikawa, Susumu, 4,976,851, Cl. 210-86.000.
Fujikawa, Yoshihiro; Suzuki, Mikio; Iwasaki, Hiroshi; Sakashita, Mitsuaki; and Kitahara, Masaki, to Nissan Chemical Industries, Ltd. Isoxazolopyridine type mevalonolactones. 4,977,161, Cl. 514-302.000.
Fujimori, Shinichiro; Yamazaki, Satoshi; Sugano, Mamoru; Kawamura, Makoto; Ninomiya, Kunihiro; Tobe, Akihiro; and Nitta, Issei, to Mitsubishi Kasei Corporation. Ethanone oximes and pharmaceutical compositions thereof. 4,977,151, Cl. 514-225.500.
Fujimoto, Roger A.; Francis, John E.; and Hutchison, Alan J., to Ciba-Geigy Corporation. Imidazo[4,5-b]pyridine derivatives as cardiovascular agents. 4,977,144, Cl. 514-46.000.
Fujino, Takuo, to Hoya Corporation. Method of pretreating glass preform with oxygen plasma. 4,976,764, Cl. 65-30.100.
Fujirebio Kabushiki Kaisha: *See*—
Hirakawa, Nobuhiko; Kashiwaba, Noriaki; Matsumoto, Hajime; Hosoda, Akihiko; Sekine, Yasuo; Isowa, Yoshikazu; Yamura, Tetsuaki; Sekine, Akihiro; and Nishikawa, Masashi, 4,977,267, Cl. 546-272.000.
Fujisaki, Yoshio: *See*—
Hiratsuka, Yutaka; Ohmi, Tadahiro; Murota, Junichi; Fujisaki, Yoshio; Noda, Masato; Kitada, Yoshimitsu; and Sahara, Terutaka, 4,976,815, Cl. 156-345.000.
Fujisawa, Nobuhiko: *See*—
Yamanari, Hiroshi; and Fujisawa, Nobuhiko, 4,976,197, Cl. 101-137.000.
Fujisawa Pharmaceutical Co., Ltd.: *See*—
Okuhara, Masakuni; Goto, Toshio; Hori, Yasuhiro; Fujita, Takashi; Ueda, Hirotsugu; and Shigematsu, Nobuharu, 4,977,138, Cl. 514-10.000.
Fujishima, Kazuyasu: *See*—
Matsuda, Yoshio; Fujishima, Kazuyasu; Ooishi, Tsukasa; Arimoto, Kazutami; and Tsukude, Masaki, 4,977,542, Cl. 365-207.000.
Fujita, Haruyasu, to Honda Giken Kogyo Kabushiki Kaisha. Stand device for two wheeled vehicles. 4,976,452, Cl. 280-293.000.
Fujita, Makoto, to Mazda Motor Corporation. Method of manufacturing hardwearing aluminum alloy part. 4,976,917, Cl. 419-33.000.
Fujita, Masakazu: *See*—
Yanagihara, Masaaki; Taniguchi, Katsutoshi; and Fujita, Masakazu, 4,976,097, Cl. 57-208.000.

Fujita, Takashi: *See*—
Okuhara, Masakuni; Goto, Toshio; Hori, Yasuhiro; Fujita, Takashi; Ueda, Hirotsugu; and Shigematsu, Nobuharu, 4,977,138, Cl. 514-10.000.

Fujita, Tsutomu: *See*—
Sawada, Kazuyuki; Ogawa, Hisashi; Yano, Kohsaku; and Fujita, Tsutomu, 4,977,104, Cl. 437-162.000.

Fujita, Yoshihiro: *See*—
Takase, Haruo; Uenaka, Kazushige; Abf, Akira; and Fujita, Yoshihiro, 4,976,870, Cl. 210-668.000.

Fujitsu America, Inc.: *See*—
Nigam, Anil K., 4,977,471, Cl. 360-77.080.

Fujitsu Limited: *See*—
Ema, Taiji, 4,977,102, Cl. 437-52.000.
Iguchi, Kazuo; Soejima, Tetsuo; Watanabe, Toshiaki; and Amemiya, Shigeo, 4,977,558, Cl. 370-112.000.
Inoue, Minoru, 4,976,839, Cl. 204-192.170.
Minami, Akira; and Tanaka, Shigeyoshi, 4,977,551, Cl. 369-44.250.
Onishi, Katsumi; and Ono, Yuto, 4,977,496, Cl. 364-200.000.
Sakakura, Shigeki; and Hayashida, Nobuyuki, 4,977,428, Cl. 355-245.000.
Suzuki, Toshiaki; Murakami, Yoji; Kobayashi, Masao; and Yamauchi, Osamu, 4,977,442, Cl. 357-70.000.
Takahashi, Hiromasa, 4,977,534, Cl. 364-748.000.

Fujiwara, Yoshio; Kobayashi, Naotake; Shinohara, Satoru; and Abe, Tetsuya, to Sony Corporation. Cover film for hard copy printing paper. 4,977,136, Cl. 503-227.000.

Fujiyama, Terumi, to Matsushita Electric Industrial Co., Ltd. Panel switch. 4,977,298, Cl. 200-5.00A.

Fukada, Toshiharu: *See*—
Hayama, Masaharu; Takaoka, Kenji; Torai, Yasushi; and Fukada, Toshiharu, 4,976,116, Cl. 62-441.000.

Fukami, Harukazu; Higuchi, Naoki; Kawaguchi, Naoko; Hashimoto, Masaki; Ide, Kinya; and Takahashi, Toshio, to Suntory Limited. Herbicidally active phenoxyalkanecarboxylic acid derivatives. 4,976,773, Cl. 71-94.000.

Fukaya, Takaharu: *See*—
Sakakibara, Shiro; and Fukaya, Takaharu, 4,976,347, Cl. 192-20.000.

Fukuda, Ryosaku: *See*—
Tani, Toshio; Kamiyama, Osamu; Matsuki, Noborn; Fukuda, Ryosaku; Akutsu, Tsukasa; and Nakatsugawa, Hiroshi, 4,976,826, Cl. 204-12.000.

Fukuda, Shigeru, to Ricoh Company, Ltd. Image recording apparatus for minimizing an output size of paper having marked an area of an input image. 4,977,463, Cl. 358-448.000.

Fukuda, Takeshi: *See*—
Itoh, Kunio; Fukuda, Takeshi; and Nakamura, Tsutomu, 4,977,200, Cl. 523-223.000.

Fukuda, Tetsuya: *See*—
Ishii, Sumio; Fukuda, Tetsuya; and Kani, Nobumoto, 4,976,805, Cl. 156-100.000.

Fukuda, Tsuyoshi, to Canon Kabushiki Kaisha. Double light blocking shutter. 4,977,421, Cl. 354-246.000.

Fukuhara, Noboru: *See*—
Maeda, Takayoshi; Hata, Masahiko; Zempo, Yasunari; Fukuhara, Noboru; and Takata, Hiroaki, 4,976,216, Cl. 118-728.000.

Fukumoto, Masumi, to Nifco Inc. Apparatus for accommodating box-like articles. 4,976,350, Cl. 206-387.000.

Fukunaga, Toshiaki: *See*—
Furukawa, Ryozo; Shinozaki, Keisuke; and Fukunaga, Toshiaki, 4,977,569, Cl. 372-50.000.

Fukuoka, Mitsuhiro; Kobayashi, Nobuaki; and Tamiya, Fumiyuki, to Kabushiki Kaisha Sakura Kurepasu. Implement for applying liquid. 4,976,564, Cl. 401-206.000.

Fukushima, Yoshihiro: *See*—
Honjo, Toshio; Sato, Yuji; Fukushima, Yoshihiro; Nawa, Masayoshi; and Yasuda, Shinichiro, 4,977,054, Cl. 430-108.000.

Fukushima, Yoshio: *See*—
Hashimoto, Teruo; Fukushima, Yoshio; Suzuki, Toshifumi; and Minamoto, Hiroshi, 4,976,491, Cl. 296-192.000.

Fuller, Stuart C. Ordering apparatus having walls with polygonal rotators. 4,976,343, Cl. 198-453.000.

Funahashi, Takeshi, to Fuji Photo Film Co., Ltd. Method for determining desired image signal ranges and method for determining image regions. 4,977,504, Cl. 364-413.130.

Fung, Shiu P., to Fatia Industrial Co., Ltd. Portable battery operated lighting device. 4,977,489, Cl. 362-184.000.

Funke, Helmut: *See*—
Franetzki, Manfred; Funke, Helmut; and Schweiker, Eugen, 4,976,703, Cl. 604-247.000.

Furkawa, Shunsuke: *See*—
Furuya, Tsuneo; Furkawa, Shunsuke; and Hori, Katsuya, 4,977,550, Cl. 369-32.000.

Furrer, Bernard: *See*—
Scheck, Werner; Idler, Siegfried; and Furrer, Bernard, 4,976,543, Cl. 356-375.000.

Furukawa Circuit Foil Co., Ltd.: *See*—
Tani, Toshio; Kamiyama, Osamu; Matsuki, Noborn; Fukuda, Ryosaku; Akutsu, Tsukasa; and Nakatsugawa, Hiroshi, 4,976,826, Cl. 204-12.000.

Furukawa, Ryozo; Shinozaki, Keisuke; and Fukunaga, Toshiaki, to Oki Electric Industry Co., Ltd. Integrated semiconductor laser. 4,977,569, Cl. 372-50.000.

Furumoto, Horace W.; Ceccon, Harry L.; and Hsia, James C., to Candela Laser Corporation. Dye laser solution circulation system. 4,977,571, Cl. 372-54.000.

Furuya, Tsuneo; Furkawa, Shunsuke; and Hori, Katsuya, to Sony Corporation. Disc playback apparatus for playback of music and digital data. 4,977,550, Cl. 369-32.000.

Furuya, Yoshikiyo, to Seiko Epson Corporation. Liquid crystal viewfinder. 4,977,456, Cl. 358-213.130.

Fushiya, Fusao; Hayashi, Akiharu; Itsuki, Fumiaki; and Nagata, Kunio, to Makita Electric Works, Ltd.; and Omron Corporation. Switching circuit for varying rotational speed of motor. 4,977,358, Cl. 318-268.000.

Fussi, Fernando: *See*—
Diaz, Victor B.; Domanico, Ricardo H.; and Fussi, Fernando, 4,977,250, Cl. 536-21.000.

G. D. Searle & Co.: *See*—
Hanson, Gunnar J.; and Baran, John S., 4,977,141, Cl. 514-19.000.

G.D. Societa' per Azioni: *See*—
Neri, Armando, 4,976,544, Cl. 356-394.000.

G. P. B. Beghelli S.r.l.: *See*—
Beghelli, Gian P., 4,976,633, Cl. 439-571.000.

G. Rodenstock Instrumente GmbH: *See*—
Reis, Werner, 4,976,535, Cl. 351-214.000.

Gabaldon, John B.; and Evans, Daniel D., Jr., to Hughes Aircraft Company. High speed digital motion controller architecture. 4,977,494, Cl. 364-167.010.

Gagnon, Kenneth M. Target launching trap. 4,976,249, Cl. 124-8.000.

Gale, Jonathan B.: *See*—
Berlin, Kenneth D.; Ford, Warren T.; Rajadhyaksha, Shirish N.; Gale, Jonathan B.; and Spruce, Lyle W., 4,977,276, Cl. 549-58.000.

Galemmo, Robert A., Jr.: *See*—
Huang, Fu-Chih; Campbell, Henry F.; Learn, Keith S.; and Galemmo, Robert A., Jr., 4,977,162, Cl. 514-314.000.

Galiakbarov, Vil F.: *See*—
Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A., 4,976,322, Cl. 175-57.000.

Galloway, F. Merrill; Campbell, Donald W.; and Runion, Tommie H., to H.B.D. Industries, Inc. Apparatus and method for measuring the length of elastomeric articles. 4,976,047, Cl. 33-735.000.

Galt Composites Limited: *See*—
Smith, Norman C., 4,976,213, Cl. 114-345.000.

Gammons, Timothy S.: *See*—
Lewins, Foster; and Gammons, Timothy S., 4,976,495, Cl. 299-1.000.

Gannon, James E.; and Thornburgh, Scott, to Great Lakes Chemical Corporation. Control of biofouling in aqueous systems by non-polymeric quaternary ammonium polyhalides. 4,976,874, Cl. 210-755.000.

Ganser, Benno: *See*—
Braehler, Georg; Ganser, Benno; and Maurer, Paul-Gerhard, 4,976,569, Cl. 405-59.000.

Garbarino, Carl, to Carolina Twist Drill, Inc. Fluted cutting tool and method of producing same. 4,976,325, Cl. 175-394.000.

Garden Reach Developments Ltd.: *See*—
Szabo, Louis, deceased; Morariu, Gavril; and Banister, Eric W., 4,976,426, Cl. 272-130.000.

Gardiner, Robert W., to Secretary of State for Defence in Her Britannic Majesty's Government of the United Kingdom of Great Britain and Northern Ireland, The. Consolidation of deposited metal. 4,976,995, Cl. 427-251.000.

Gardner, Hugh C.; and Newman-Evans, Richard H., to Amoco Corporation. Carboxylated rubber particles as toughening for fiber reinforced composites. 4,977,215, Cl. 525-119.000.

Gardner, Hugh C.; and Newman-Evans, Richard H., to Amoco Corporation. Carboxylated rubber particles as toughening for fiber reinforced composites. 4,977,218, Cl. 525-329.300.

Gargano, Christopher W.: *See*—
Bettle, Griscom, III; and Gargano, Christopher W., 4,977,004, Cl. 428-36.700.

Garlich, Joseph R.: *See*—
Simon, Jaime; Garlich, Joseph R.; Wilson, David A.; and McMillan, Kenneth, 4,976,950, Cl. 424-1.100.

Garrett, Michael E., to BOC Group, Inc., The. Refrigerated containers. 4,976,109, Cl. 62-18.000.

Garrigue, Roger; and Lalo, Jack, to Norsolor S.A. Process for manufacturing urea/formaldehyde resins. 4,977,237, Cl. 528-230.000.

Garrigue, Roger; and Lalo, Jack, to Norsolor S.A. Additives suitable for use in aminoplastic resins. 4,977,238, Cl. 528-230.000.

Gatley, Richard; Fox, Ian F.; and Neale, Greville T. Method of making a cooling device. 4,976,910, Cl. 264-278.000.

Gauthier, Robert J.; and Levinson, Robert S., to Abbott Laboratories. Peritoneal dialysis method. 4,976,683, Cl. 604-29.000.

Gawlik, Norbert: *See*—
Madle, Wolfgang; Gawlik, Norbert; and Popp, Franz W., 4,976,912, Cl. 376-249.000.

Geary, Frederick J., to Robertshaw Controls Company. Hot surface ignition system for a gas furnace, control device therefor and methods of making the same. 4,976,605, Cl. 431-27.000.

Gee, Arnold E.; and Shank, Jeffrey B., to GTE Products Corporation. Pocket fiber optic cleaver. 4,976,390, Cl. 225-96.000.

Gehring, Mark R.: *See*—
Price, Gary A.; Park, Daniel J.; and Gehring, Mark R., 4,977,399, Cl. 340-825.440.

Geiger, Herbert B.: *See—*
Smith, David A.; Geiger, Herbert B.; and Dowell, Albert C., 4,976,673, Cl. 493-194.000.
Geiger, John. Bicycle carrier. 4,976,386, Cl. 224-42.45R.
Gelin, Robert J.; and Blackmore, Richard D., to Ozite Corporation. Tubular member having a liner. 4,976,290, Cl. 138-141.000.
Gementi, Francesco; Sogli, Loris; and Ungarelli, Raffaele, to Istituto Guido Donegani S.p.A. Process of producing a silanic or siloxanic compound containing at least one cycloalkyl ring. 4,977,291, Cl. 556-466.000.
Gemmell, Peter A.: *See—*
Bradbury, Roy; Gemmell, Peter A.; and Hann, Richard A., 4,977,135, Cl. 503-227.000.
General Electric Company: *See—*
Eckberg, Richard P., 4,977,198, Cl. 522-25.000.
Evans, Edwin R., 4,977,289, Cl. 556-454.000.
Evans, Edwin R.; and Maitoza, Paul, 4,977,290, Cl. 556-459.000.
Harper, Jack D.; Clayton, Richard W.; and Olikara, Philip, 4,977,408, Cl. 343-792.500.
Taylor, John B., 4,976,102, Cl. 60-226.100.
General Motors Corporation: *See—*
Acciacca, Allan C.; and Gergoe, Bela, 4,976,478, Cl. 292-201.000.
Cogswell, James A., II; and Coulter, James L., 4,976,500, Cl. 303-110.000.
Hovarter, Len A., 4,976,284, Cl. 137-512.400.
Klemen, Donald, 4,976,670, Cl. 475-278.000.
Lovelace, Richard R., 4,976,489, Cl. 296-180.100.
Martell, William A.; Weiss, Ladislaus; VanJaarsveld, Robert P.; and Brown, Colin R., 4,976,400, Cl. 249-134.000.
Mathes, Bernhard; Gosing, Guenter; and Oberfrank, Martin, 4,976,578, Cl. 411-512.000.
Sharp, Harold L.; and Kinkade, Charles E., 4,976,171, Cl. 74-878.000.
Short, William T.; and Hoerner, Rebecca S., 4,976,896, Cl. 264-1.900.
Smith, Jack E., 4,976,417, Cl. 267-25.000.
Genex Corporation: *See—*
Fahnestock, Stephen R.; Lee, Timothy; and Wroble, Marie H., 4,977,247, Cl. 530-387.000.
Genrad, Inc.: *See—*
Andrews, Harold G., 4,977,370, Cl. 324-158.00F.
Gentile, Ken: *See—*
Cline, John; and Gentile, Ken, 4,977,530, Cl. 364-579.000.
Gentle, Derek F., to Ford Motor Company. Reinforced composite structure. 4,976,490, Cl. 296-183.000.
George, Pascal: *See—*
Sevrin, Mireille; George, Pascal; Menin, Jacques; Morel, Claude; and Bigg, Dennis, 4,977,159, Cl. 514-292.000.
George, Raymond D.: *See—*
Barker, Sidney A.; Baggett, Neil; Stevenson, John; George, Raymond D.; De Courcy, David R.; Hammond, Timothy; and Bradley, Martin, 4,977,209, Cl. 524-594.000.
Georgia-Pacific Corporation: *See—*
McVay, Ted M.; and Baxter, Gene F., 4,977,231, Cl. 528-142.000.
Gergoe, Bela: *See—*
Acciacca, Allan C.; and Gergoe, Bela, 4,976,478, Cl. 292-201.000.
Germann, Anita: *See—*
Phillips, Wilson C.; Germann, Anita; and Olm, Orville J., 4,976,196, Cl. 100-233.000.
Gersdorf, Joachim; and Kleiner, Hans-Jerg, to Hoechst Aktiengesellschaft. Alkenylphosphonic and -phosphinic acid esters, process for their preparation, and a radiation-polymerizable mixture containing said compounds. 4,977,066, Cl. 430-277.000.
Gershman, Lennie. Splash-free controlled access water supply apparatus for animals. 4,976,220, Cl. 119-18.000.
Gershuni, Alexandr N.; Maisotsenko, Valery S.; Kaminnik, Alexandr A.; Zaripov, Vladilen K.; Nischik, Alexandr P.; and Levterov, Alexandr I. Apparatus for indirect evaporative gas cooling. 4,976,113, Cl. 62-314.000.
Gessner, Scott L.: *See—*
Krupp, Stephen P.; and Gessner, Scott L., 4,977,023, Cl. 428-367.000.
Geyer, Werner: *See—*
Schierling, Roland; Wissmann, Michael; Nickel, Hans; and Geyer, Werner, 4,976,246, Cl. 123-509.000.
Ghazi, Mahmood M. Compact workout apparatus. 4,976,428, Cl. 272-134.000.
Gibbs, Walden L., Jr.; Curry, Jimmie L.; and Mostyn, William T., to Toni Diagnostics, Inc. Leak and clog detection and removal system for use with particle counters. 4,977,517, Cl. 364-510.000.
Gibeau, Pierre: *See—*
Delagebeaudeuf, Daniel; Derewonko, Henri; Godart, Jean J.; Resneau, Patrick; and Gibeau, Pierre, 4,977,434, Cl. 357-22.000.
Gibson, Charles A.: *See—*
Burgess, Lloyd M.; and Gibson, Charles A., 4,977,266, Cl. 544-398.000.
Gibson, Harry W.; and Jois, Yajnanarayana H. R., to Virginia Tech Intellectual Properties Inc. Reissert compound of bisbenzimidazole. 4,977,271, Cl. 548-328.000.
Gibson, Jeremy H., to Leichtung Inc. Anti-kickback hold down device. 4,976,298, Cl. 144-249.00B.
Gibson, Ray G.; and Droho, Joseph, to North American Philips Corp. High pressure sodium discharge lamp having gas filled outer envelope. 4,977,346, Cl. 313-25.000.
Giebel, Harald: *See—*
Zucker, Armand S.; Breslow, David S.; and Giebel, Harald, 4,976,360, Cl. 211-186.000.
Gill, David C.; and Ali, Eren, to Nomix Manufacturing Company Limited. Equipment for delivering fluid. 4,976,465, Cl. 239-224.000.
Gillfillan, Patricia B.: *See—*
Tacquard, Timothy L.; and Gillfillan, Patricia B., 4,976,620, Cl. 434-81.000.
Gillis, Herbert R., to Imperial Chemical Industries PLC. Elastomers. 4,977,195, Cl. 521-155.000.
Gillmore, Stephen R.; and Merritt, Carleton G., to Borden, Inc. Reduced calorie, high fiber pasta. 4,976,982, Cl. 426-557.000.
Gilmanov, Murat K.; Dilbarkanova, Rsai; and Sultanbaev, Beibyt E. Method for preparing phosphatidylinositol from vegetable matter. 4,977,091, Cl. 435-271.000.
Giniewicz, Jayne R.; Newnham, Robert E.; Cross, Leslie E.; and Safari, Ahmad, to Hoechst Celanese Corp. Method of detecting sound in water using piezoelectric-polymer composites with 0-3 connectivity. 4,977,547, Cl. 367-157.000.
Ginnow-Merkert, Hartmut: *See—*
Plummer, David D.; and Ginnow-Merkert, Hartmut, 4,976,066, Cl. 49-225.000.
Ginzburg, Vladimir B.; and Ellis, Robert H., to United Engineering, Inc. Tension measuring apparatus. 4,976,158, Cl. 73-862.070.
Girardot, Jean-Marie, to Biomedical Design, Inc. Prevention of prosthesis calcification. 4,976,733, Cl. 623-11.000.
Girotra, Nirindar N.: *See—*
Biftu, Tesfaye; Ponpipom, Mitree M.; and Girotra, Nirindar N., 4,977,146, Cl. 514-99.000.
Giroud-Abel, Bruno; and Goletto, Jean, to Rhone-Poulenc Specialites Chimiques. Moulding compositions comprised of semirigid, fatty acid copolyamides, elastomers and optionally conventional polyamides. 4,977,213, Cl. 525-66.000.
Gladd, Andrew J., to Gladd Industries, Inc. Smokehouse assembly. 4,976,009, Cl. 452-198.000.
Gladd Industries, Inc.: *See—*
Gladd, Andrew J., 4,976,009, Cl. 452-198.000.
Glaxo Group Limited: *See—*
Collington, Eric W.; Hallett, Peter; Wallis, Christopher J.; Wadsworth, Alan; and Hayes, Norman F., 4,977,163, Cl. 514-317.000.
Glidden Company, The: *See—*
Lazaro, Eulogio D., 4,976,836, Cl. 204-181.700.
Globe-Union Inc.: *See—*
Abujudom, David N., II; Dougherty, Thomas J.; Inkmann, Mark S.; Johnson, Richard T.; Karolek, Neil C.; and Saari, David W., 4,976,327, Cl. 180-68.200.
Gluck, Eric H.; Thompson, Brian E.; and Hall, Michael A., to Advanced Pulmonary Technologies, Inc. Endotracheal tube with inflatable cuffs. 4,976,261, Cl. 128-207.150.
Godart, Jean J.: *See—*
Delagebeaudeuf, Daniel; Derewonko, Henri; Godart, Jean J.; Resneau, Patrick; and Gibeau, Pierre, 4,977,434, Cl. 357-22.000.
Godfrey, Christopher R. A.: *See—*
Anthony, Vivienne M.; Clough, John M.; and Godfrey, Christopher R. A., 4,976,771, Cl. 71-90.000.
Goebel, Irmhild: *See—*
Uphues, Guenter; Ploog, Uwe; Becker, Wolfgang; and Goebel, Irmhild, 4,977,294, Cl. 558-208.000.
Goepfert, Serge P. P.; and Guillevic, Gildas J. M., to Corning Incorporated. Laminated transparent polarizing glasses and method of making. 4,977,028, Cl. 428-426.000.
Goguen, George; and Norton, Shelley C., to Habistat Corporation. Animal shipping container. 4,976,219, Cl. 119-15.000.
Gold, Steven K. Needle and safety cover assembly for syringes and the like. 4,976,699, Cl. 604-192.000.
Golden Aluminum Company: *See—*
McAuliffe, Donald C.; and Marsh, Ivan M., 4,976,790, Cl. 148-2.000.
Goldstart Co. Ltd.: *See—*
Lee, Keun C., 4,977,539, Cl. 369-44.110.
Goldstein, Arthur J.; and Parsi, Edgardo J., to Ionics, Incorporated. Process for monitoring the quality of water. 4,977,094, Cl. 436-157.000.
Goletto, Jean: *See—*
Giroud-Abel, Bruno; and Goletto, Jean, 4,977,213, Cl. 525-66.000.
Golland, Wesley A.: *See—*
Baker, Joseph R.; Golland, Wesley A.; Mullens, Paul A.; and Trimble, Roger B., 4,977,502, Cl. 364-405.000.
Gomola, John W.: *See—*
Gregg, Gerald L.; Putman, Richard E.; and Gomola, John W., 4,977,529, Cl. 364-578.000.
Gooch, Jan W., to Hoechst Celanese Corporation. Methods for forming magnetic coatings using trioxane recording media having such coatings. 4,977,021, Cl. 428-329.000.
Goode, Steve H.: *See—*
Linder, Donald L.; Goode, Steve H.; Kazecki, Henry L.; Dennis, Donald W.; and Baker, James C., 4,977,616, Cl. 455-277.000.
Goodwin, James M.; Rosen, Bruce E.; Vidal, Jacques J.; Mackenzie, John D.; and Wu, Edward T. H., to University of California, The Regents of the. Spin glass type associative processor system. 4,977,540, Cl. 365-49.000.
Goodyear Tire & Rubber Company, The: *See—*
Kneip, Fernand, 4,976,804, Cl. 156-401.000.
Scannapieco, Steven N., 4,977,196, Cl. 521-182.000.

Goozen, Robert: *See—*
Langdon, Albert K.; Learmont, Robert O.; Robinson, Darrell; Goozen, Robert; Lewis, Michael; Williams, John; Pruehs, Allen V.; and Shincovich, John T., 4,977,482, Cl. 361-366.000.

Gordon, Ian A.; and Foster, Howard J. Christmas tree stand. 4,976,411, Cl. 248-524.000.

Gorgone, Robert L., to Ardac, Inc. Cassette cash box for currency validator. 4,977,583, Cl. 377-8.000.

Goscenski, Edward J., Jr., to Eaton Corporation. Differential clutch and lever actuation system therefor. 4,976,667, Cl. 475-86.000.

Gosing, Guenter: *See—*
Mathes, Bernhard; Gosing, Guenter; and Oberfrank, Martin, 4,976,578, Cl. 411-512.000.

Goslee, Michael D.: *See—*
Manson, Larry J.; and Goslee, Michael D., 4,977,394, Cl. 340-679.000.

Gosselink, Eugene P.: *See—*
Maldonado, Rene; Trinh, Toan; and Gosselink, Eugene P., 4,976,879, Cl. 252-8.700.

Goto, Toshio: *See—*
Okuhara, Masakuni; Goto, Toshio; Hori, Yasuhiro; Fujita, Takashi; Ueda, Hirotsugu; and Shigematsu, Nobuharu, 4,977,138, Cl. 514-10.000.

Gotoh, Hiroshi, to Ricoh Company, Ltd. Split type optical pick-up device with a tracking error detector on the moving part. 4,977,552, Cl. 369-44.140.

Gotoh, Hiroya: *See—*
Suzuki, Haruo; and Gotoh, Hiroya, 4,976,188, Cl. 91-369.200.

Gotoh, Masaki, to Alps Electric Co., Ltd. Illuminating display device 4,977,486, Cl. 362-27.000.

Gottardo, Fulvio; and Checchinato, Bruno, to Molex Incorporated. Locking electrical connector. 4,976,635, Cl. 439-849.000.

Gottschalk, Peter; Neckers, Douglas C.; Schuster, Gary B.; Adair, Paul C.; and Pappas, S. Peter, to Mead Corporation, The. Photosensitive materials containing ionic dye compound as initiators. 4,977,511, Cl. 364-473.000.

Graafmans, Hans: *See—*
Coombs, Peter M.; and Graafmans, Hans, 4,977,432, Cl. 355-309.000.

Grach, Ayzik, to McNeil (Ohio) Corporation. Reciprocating pump. 4,976,192, Cl. 92-165.00R.

Gradco Systems, Inc.: *See—*
Coombs, Peter M.; and Graafmans, Hans, 4,977,432, Cl. 355-309.000.

Graeff, Thor G.: *See—*
Ilmasti, Veikko; and Graeff, Thor G., 4,977,318, Cl. 250-253.000.

Graner, Juergen; Kirchner, Marcel; and Kubach, Hans, to Robert Bosch GmbH. Electromagnetically actuatable valve. 4,976,405, Cl. 251-129.160.

Granger, Edward M.; Hamilton, John F., Jr.; and Wash, Larry G., to Eastman Kodak Company. Apparatus for addressing a font to suppress Moire patterns occurring thereby and a method for use therein. 4,977,458, Cl. 358-456.000.

Grauherr, Keith R.: *See—*
Wuepper, Thomas E.; Grauherr, Keith R.; Tate, Orren R.; and Philo, Alfred D., 4,976,303, Cl. 164-29.000.

Graye, Dale L. Cleaning tool with demand-responsive air port. 4,976,005, Cl. 15-322.000.

Great Eastern (Bermuda) Ltd.: *See—*
Ripley, Ian; and Needham, Anthony H., 4,976,278, Cl. 137-15.000.

Great Lakes Carbon Corporation: *See—*
Moore, Lyman T.; and Travers, Mark D., 4,977,576, Cl. 373-93.000.

Great Lakes Chemical Corporation: *See—*
Gannon, James E.; and Thornburgh, Scott, 4,976,874, Cl. 210-755.000.

Greco, Alberto; Busetto, Carlo; Cassar, Luigi; and Neri, Carlo, to Enichem Sintesi S.p.A. Process for preparing reactive stabilizing compound. 4,977,259, Cl. 544-69.000.

Green, Eric T.; and Scholz, James P., to AMP Incorporated. Means and method of securing an insert in a shell. 4,976,634, Cl. 439-589.000.

Green, Wesley F., to University of Sydney. Antiallergenic agent. 4,977,142, Cl. 514-23.000.

Greenspan, David C., to Vesuvius Crucible Company. Protective cladding for a molybdenum substrate. 4,977,001, Cl. 428-34.600.

Gregg, Gerald L.; Putman, Richard E.; and Gomola, John W., to Westinghouse Electric Corp. Training simulator for a nuclear power plant. 4,977,529, Cl. 364-578.000.

Gregory, Walter A.: *See—*
Brittelli, David R.; Corless, Peter F.; Gregory, Walter A.; and Park, Chung-Ho, 4,977,173, Cl. 514-376.000.

Gress, Wolfgang: *See—*
Hoefer, Rainer; Gruetzmacher, Roland; Gress, Wolfgang; and Nagorny, Ulrich, 4,977,207, Cl. 524-507.000.

Grey, Mark I., to Conoco Specialty Products Inc. Cyclone separator. 4,976,872, Cl. 210-739.000.

Griffith, Donald P.; and Homsy, Charles A. Prosthetic bladder and method of prosthesis implantation. 4,976,735, Cl. 623-12.000.

Grimard, Francois X., to Fuel Tech, Inc. Burner apparatus for providing adjustable flame geometry. 4,976,607, Cl. 431-174.000.

Grimmer, Johannes: *See—*
Meyer, Joachim; Buehler, Wolfgang; Grimmer, Johannes; Eipper, Gunter; Kiefer, Hans; and Martin, Christoph, 4,977,190, Cl. 514-951.000.

Grims, Conrad M.; Johansson, Bert E.; and Hahn, Roger A., to Adolph Coors Company. Can body making apparatus. 4,976,131, Cl. 72-347.000.

Grinde, James E., to Yamaha Hatsudoki Kabushiki Kaisha. Surface drive for marine craft having inboard engine. 4,976,638, Cl. 440-57.000.

Grinstead, Robert R.; and Paalman, H. Hunter, to Dow Chemical Company, The. Concentric tubular membrane device and process useful in ion exchange or absorbent processes. 4,976,866, Cl. 210-638.000.

Grob, James T.; and Caron, Richard N., to Frymaster Corporation, The. Flashback resistant infrared gas burner apparatus. 4,976,609, Cl. 431-326.000.

Gros, Pierre: *See—*
Jansen, Franz; and Gros, Pierre, 4,977,280, Cl. 549-343.000.

Grosjean, Pierre, to Rhone-Poulenc Films. Composite PVDC-coated polyester films. 4,977,032, Cl. 428-483.000.

Grossman, Shlomo; and Albeck, Michael, to Bar Ilan University. Food supplements. 4,976,960, Cl. 424-195.100.

Gruber, Wolfgang: *See—*
Kerth, Juergen; Werner, Rainer A.; Zolk, Ralf; Ruempler, Klaus-Dieter; Schweier, Guenther; Mueller-Mall, Rudolf; and Gruber, Wolfgang, 4,977,210, Cl. 525-53.000.

Gruening, Rainer, to Troy Chemical Corporation. Wood preservative and soil treatment composition. 4,977,186, Cl. 514-479.000.

Gruetzmacher, Roland: *See—*
Hoefer, Rainer; Gruetzmacher, Roland; Gress, Wolfgang; and Nagorny, Ulrich, 4,977,207, Cl. 524-507.000.

Grumman Aerospace Corporation: *See—*
Brandstetter, Robert W.; and Fonneland, Nils J., 4,976,520, Cl. 350-384.000.
Edelstein, Fred; Liandris, Maria; and Brown, Richard F., 4,976,754, Cl. 55-159.000.

Grundl, Peter: *See—*
Arnold, Werner; and Grundl, Peter, 4,977,393, Cl. 340-636.000.

GT Development Corporation: *See—*
Morris, John M.; and St. John, Roger, 4,976,104, Cl. 60-412.000.

GTE Airfone Incorporated: *See—*
Hollowed, Edward J.; and Oldani, Jerome L., 4,977,592, Cl. 379-428.000.

GTE Cellular Communications Corporation: *See—*
McClure, Dana W., 4,977,609, Cl. 455-89.000.

GTE Products Corporation: *See—*
Anand, Vidhu; Houck, David L.; and Smouse, Dennis C., 4,976,948, Cl. 423-607.000.
Gee, Arnold E.; and Shank, Jeffrey B., 4,976,390, Cl. 225-96.000.

Guenther, Cameron. Ball tee. 4,976,431, Cl. 273-26.00R.

Guetle, Norbert J., Jr.: *See—*
Doolan, Martin P.; Duvall, Dale R.; Guetle, Norbert J., Jr.; and Rajagopol, Ganesh, 4,976,122, Cl. 70-134.000.

Guichard, Jean; and Favre, Christian, to Messier-Hispano-Bugatti. Braking system for use when towing an aircraft on the ground. 4,976,499, Cl. 303-13.000.

Guillevic, Gildas J. M.: *See—*
Goepfert, Serge P. P.; and Guillevic, Gildas J. M., 4,977,028, Cl. 428-426.000.

Gulinelli, Silvio: *See—*
Baradel, Agostino; Della Penna, Gino; Gulinelli, Silvio; Valdiserri, Mario; and Robertiello, Andrea, 4,976,864, Cl. 210-610.000.

Gutsche, Bernhard: *See—*
Jeromin, Lutz; Peukert, Eberhard; Gutsche, Bernhard; Wollmann, Gerhard; and Schleper, Bernard, 4,976,892, Cl. 260-410.700.

Gyure, Katherine A.: *See—*
Liang, Rong-Chang; Simpson, William H.; Gyure, Katherine A.; and Carpenter, Kenneth P., 4,977,059, Cl. 430-138.000.

H.B.D. Industries, Inc.: *See—*
Galloway, F. Merrill; Campbell, Donald W.; and Runion, Tommie H., 4,976,047, Cl. 33-735.000.

H.M. Electronics, Inc.: *See—*
Kutz, Donald A.; and Fasen, Kenneth R., 4,977,610, Cl. 455-120.000.

Haas, Peter; and Hettel, Hans, to Bayer Aktiengesellschaft. Process for the preparation of polyurethane foams. 4,977,194, Cl. 521-99.000.

Haase, Josef: *See—*
Kipphan, Helmut; and Haase, Josef, 4,976,545, Cl. 356-446.000.

Haast, William E. Degradable syringe. 4,976,693, Cl. 604-110.000.

Habara, Hideaki: *See—*
Sugimori, Teruhiko; Suzuki, Fumio; Habara, Hideaki; and Inada, Hiromasa, 4,977,241, Cl. 528-497.000.

Habegger, Harold. Method and automatic machine for machining coiled stock. 4,976,572, Cl. 409-132.000.

Haberle, Norman; and Reutter, Anneliese, to Dow Chemical Company, The. 3-halosuccinimides and plant fungicidal use thereof. 4,977,183, Cl. 514-425.000.

Habistat Corporation: *See—*
Goguen, George; and Norton, Shelley C., 4,976,219, Cl. 119-15.000.

Hachtel, Hansjorg: *See—*
Dobler, Klaus; Hachtel, Hansjorg; and Zimmermann, Georg, 4,976,160, Cl. 74-862.360.

Hackett, Brian K.: *See—*
Winzenz, Wayne L.; and Hackett, Brian K., 4,977,510, Cl. 364-463.000.

Haddad, Richard A.: *See—*
Chen, Walter Y.; and Haddad, Richard A., 4,977,591, Cl. 379-410.000.

Hagin, Faust; and Drewitz, Hans, to Man Nutzfahrzeuge Aktiengesellschaft of Munchen. Vehicle drive transmission having a high power ratio. 4,976,664, Cl. 475-80.000.

Hagin, Faust; and Flenker, Helmut, to Man Nutzfahrzeuge AG. Vehicle drive device with a hydrostatic-mechanical power splitting transmission. 4,976,665, Cl. 475-80.000.

Hagishita, Sanji: *See*—
Narisada, Masayuki; Ohtani, Mitsuaki; Watanabe, Fumihiko; Hagishita, Sanji; Seno, Kaoru; and Kamata, Susumu, 4,976,891, Cl. 260-401.000.

Hagmann, Stefan: *See*—
Studer, Werner; Hagmann, Stefan; and Strotz, Marcel, 4,977,310, Cl. 235-375.000.

Hahn, Paul; Reynolds, John; Tomlinson, Alan; O'Meara, Robert J.; and Drazba, Martin, to Schering Corporation. Method for measuring the rotation of an assymetric contact lens and lenses for practicing the method. 4,976,533, Cl. 351-160.00R.

Hahn, Roger A.: *See*—
Grims, Conrad M.; Johansson, Bert E.; and Hahn, Roger A., 4,976,131, Cl. 72-347.000.

Haibara, Yukio: *See*—
Iwamoto, Nobuya; Umesaki, Norimasa; Hidaka, Hiroaki; and Haibara, Yukio, 4,976,806, Cl. 156-325.000.

Halblander, Karl-Heinz: *See*—
Ball, Keith V.; Halblander, Karl-Heinz; and Loftus, Barry N., 4,976,686, Cl. 604-61.000.

Hale Fire Pump Company: *See*—
Eberharot, H. Alfred; and Teske, Richard E., 4,976,319, Cl. 169-54.000.

Hall, Charles; and Fry, Michael. Apparatus and method for sealing tubes. 4,976,307, Cl. 165-76.000.

Hall, Estill T., Jr.: *See*—
Rodriguez-Cavazos, Enrique; Altmanshofer, Robert D.; Parker, Robert P.; and Hall, Estill T., Jr., 4,977,355, Cl. 315-368.000.

Hall, Iris H.: *See*—
McPhail, Andrew T.; Spielvogel, Bernard F.; and Hall, Iris H., 4,977,268, Cl. 548-110.000.

Hall, Michael A.: *See*—
Gluck, Eric H.; Thompson, Brian E.; and Hall, Michael A., 4,976,261, Cl. 128-207.150.

Hall, Steven E.: *See*—
Stein, Philip D.; and Hall, Steven E., 4,977,174, Cl. 514-382.000.

Hallett, Peter: *See*—
Collington, Eric W.; Hallett, Peter; Wallis, Christopher J.; Wadsworth, Alan; and Hayes, Norman F., 4,977,163, Cl. 514-317.000.

Halliday, George M., to A&W Fullarton Limited. Pallet box container. 4,976,353, Cl. 206-386.000.

Halsey, James H.: *See*—
Juds, Scott; Halsey, Johnny H.; and Halsey, James H., 4,976,346, Cl. 194-200.000.

Halsey, Johnny H.: *See*—
Juds, Scott; Halsey, Johnny H.; and Halsey, James H., 4,976,346, Cl. 194-200.000.

Hamada, Akira: *See*—
Obuchi, Yasuji; Hamada, Akira; Akiyama, Hirokatsu; and Nakamura, Yasuhisa, 4,976,182, Cl. 84-462.000.

Hamilton Distributing Company: *See*—
Bush, Jerome J., 4,976,378, Cl. 222-55.000.

Hamilton, James E., to Martin Electronics, Inc. Non-lethal distraction device. 4,976,201, Cl. 102-323.000.

Hamilton, John F., Jr.: *See*—
Granger, Edward M.; Hamilton, John F., Jr.; and Wash, Larry G., 4,977,458, Cl. 358-456.000.

Hammond, Timothy: *See*—
Barker, Sidney A.; Baggett, Neil; Stevenson, John; George, Raymond D.; De Courcy, David R.; Hammond, Timothy; and Bradley, Martin, 4,977,209, Cl. 524-594.000.

Hancock, Donald J.: *See*—
Eckhardt, Wiifred O.; Williamson, Weldon S.; Hancock, Donald J.; and Robson, Ronald R., 4,977,329, Cl. 250-551.000.

Hancock, James R.: *See*—
McAndless, John M.; Hancock, James R.; Barnett, Donald B.; Olm, Orville J.; Locke, Terry J. A.; and Maybank, John, 4,976,924, Cl. 422-99.000.

Handa, Etsumi: *See*—
Hayashi, Kiyotaka; Handa, Etsumi; Yamamoto, Yorihisa; and Tanaka, Hiroshi, 4,976,170, Cl. 74-866.000.

Handa, Junichi: *See*—
Ito, Hiroshi; Handa, Junichi; Takagi, Yoshio; and Minohara, Taketoshi, 4,976,787, Cl. 106-441.000.

Handler, Howard, to Deltec Electronics Corporation. Crest factor correction circuit. 4,977,334, Cl. 307-260.000.

Hangai, Toshimasa; Ishitoya, Koichi; and Tagawa, Akihiko, to Pioneer Electronic Corporation. Slider-position detector for detecting the position of the slider of a disk player. 4,977,554, Cl. 369-215.000.

Hanil Industrial Co., Ltd.: *See*—
Soo, Yang K., 4,976,463, Cl. 237-8.00C.

Hanke, Christian, to Siemens Aktiengesellschaft. Semiconductor laser arrangement for high output powers in the lateral fundamental mode. 4,977,567, Cl. 372-45.000.

Hankison Corporation: *See*—
Foltz, Donald R., 4,976,759, Cl. 55-487.000.

Hann, Richard A.: *See*—
Bradbury, Roy; Gemmell, Peter A.; and Hann, Richard A., 4,977,135, Cl. 503-227.000.

Hano, Paul: *See*—
Ceron, Daniel; Lodomez, Christian; Hano, Paul; and Erard, Jose, 4,976,123, Cl. 70-369.000.

Hans, Rudiger; and Winkler, Otmar, to SKF GmbH. Slide rail for tightening a transmission. 4,976,659, Cl. 474-111.000.

Hansen, Guenter: *See*—
Dix, Johannes P.; Hansen, Guenter; and Kast, Hellmut, 4,976,744, Cl. 8-527.000.

Hansen, Willy. Adjustable picture hanger. 4,976,409, Cl. 248-469.000.

Hanson, Gary S.: *See*—
Dobyns, Loren K.; Hanson, Gary S.; and Shrum, Durel B., 4,976,756, Cl. 55-341.100.

Hanson, Gunnar J.; and Baran, John S., to G. D. Searle & Co. Peptidyl α-aminoacyl aminodiol carbamates as anti-hypertensive agents. 4,977,141, Cl. 514-19.000.

Hanssen, Carl-Otto, to Molnlycke AB. Surgical drape and a method for its manufacture. 4,976,274, Cl. 128-849.000.

Hara, Eiichi: *See*—
Nagata, Tatsuya; Yamada, Takehiko; Hara, Eiichi; and Watanabe, Michihiro, 4,977,313, Cl. 250-208.100.

Hara, Mitsuhiko; Takizawa, Shozo; Tanaka, Tadao; Taniguchi, Yasutaka; Wada, Shunichi; and Ohtagaki, Shigeki, to Mitsubishi Jidosha Kogyo Kabushiki Kaisha; and Mitsubishi Denki Kabushiki Kaisha. Suspension control apparatus for an automotive vehicle. 4,977,506, Cl. 364-424.050.

Harada, Chikao: *See*—
Kurosawa, Kimimasa; Harada, Chikao; Sakai, Hiroshi; and Niwa, Minoru, 4,976,268, Cl. 128-687.000.

Harada, Naoki: *See*—
Kayane, Yutaka; Omura, Takashi; Harada, Naoki; Mori, Yasuji; Yamamoto, Yosuke; Miyamoto, Tetsuya; and Kusumoto, Takehiro, 4,977,261, Cl. 544-199.000.

Hardwick, William A., Jr.: *See*—
Scholle, William R.; Savage, Chester; and Hardwick, William A., Jr., 4,976,381, Cl. 222-484.000.

Hardwicke, Redwell: *See*—
Steele, James R.; and Hardwicke, Redwell, 4,976,288, Cl. 138-120.000.

Hardy, Jean-Claude; and Renault, Christian, to Rhone-Poulenc Sante. Benzopyran derivatives and pharmaceutical compositions containing them. 4,977,166, Cl. 514-323.000.

Hardy, Stephen N., to American Greetings Corporation. Rotatable articulated merchandise display unit. 4,976,359, Cl. 211-58.000.

Hares, George B.: *See*—
Amundson, W. Duane, Jr.; Boek, Heather; Hares, George B.; and Pfitzenmaier, Robert W., 4,977,110, Cl. 501-7.000.

Harlan Corporation: *See*—
Kaplan, James H., 4,976,453, Cl. 280-479.200.

Harlow, Thomas L., Jr. Station bar. 4,976,631, Cl. 439-535.000.

Harper, Jack D.; Clayton, Richard W.; and Olikara, Philip, to General Electric Company. Deployable antenna bay. 4,977,408, Cl. 343-792.500.

Harrison, John R.; and Van Noy, John R., to Ward Machinery Company, The. Squaring folded container blanks. 4,976,672, Cl. 493-130.000.

Harrison, Roger G.: *See*—
Ferguson, Thomas H.; Harrison, Roger G.; and Moore, David L., 4,977,140, Cl. 514-12.000.

Hartig, William J.: *See*—
Mangini, Richard J.; and Hartig, William J., 4,976,351, Cl. 206-232.000.

Hartmann, Egon, to Senkingwerke GmbH & Co. Piston-type apparatus for expressing water from laundry. 4,976,119, Cl. 68-242.000.

Hartmann, Wilbert J. A. M., to U.S. Philips Corporation. Method of driving a ferroelectric to display device to achieve gray scales. 4,976,515, Cl. 350-333.000.

Harville, Terry L. Boring bar-cutter head fixture. 4,976,418, Cl. 269-43.000.

Hase, Brigitte: *See*—
Wisotzki, Klaus-Dieter; Schumann, Klaus; Engelskirchen, Konard; and Hase, Brigitte, 4,976,885, Cl. 252-174.170.

Hasegawa, Hiroshi; Mogi, Kinichi; Shioiri, Noriaki; Sato, Susumu; and Katori, Tatsuhiko, to SS Pharmaceutical Co., Ltd. Pyrrole derivatives. 4,977,275, Cl. 548-539.000.

Hasegawa, Mitsutoshi, to Canon Kabushiki Kaisha. Semiconductor laser array with stripe electrodes having pads for wire bonding. 4,977,570, Cl. 372-50.000.

Hashimoto, Hiroshi: *See*—
Aonuma, Masashi; Okita, Tsutomu; Hashimoto, Hiroshi; and Kobayashi, Kingo, 4,976,989, Cl. 427-48.000.

Hashimoto, Kazuhiko; Koizumi, Taichi; Kawakita, Kenji; and Nomura, Noboru, to Matsushita Electric Industrial Co., Ltd. Fine pattern forming method. 4,976,818, Cl. 156-643.000.

Hashimoto, Kiroyuki; Iizuka, Nobuo; and Suzuki Akira, to Kabushiki Kaisha Kenwood. Radio communication system. 4,977,608, Cl. 425-62.000.

Hashimoto, Masaki: *See*—
Fukami, Harukazu; Higuchi, Naoki; Kawaguchi, Naoko; Hashimoto, Masaki; Ide, Kinya; and Takahashi, Toshio, 4,976,773, Cl. 71-94.000.

Hashimoto, Shinicni: *See*—
Kanetake, Satoshi; Hashimoto, Shinichi; Ono, Shigetoshi; and Naoi, Takashi, 4,977,071, Cl. 430-534.000.

Hashimoto, Takao: *See*—
Sakurada, Satoshi; Tagaya, Nobuaki; Miura, Tadashi; Maeshima, Tsugio; and Hashimoto, Takao, 4,977,120, Cl. 502-64.000.

Hashimoto, Teruo; Fukushima, Yoshio; Suzuki, Toshifumi; and Minamoto, Hiroshi, to Mazda Motor Corporation. Cowl and dash

panel assembly for a front body construction of a motor vehicle. 4,976,491, Cl. 296-192.000.
Hashimoto, Toshikazu: *See—*
Murayama, Hiroki; Tsujisawa, Takahiko; and Hashimoto, Toshikazu, 4,977,470, Cl. 360-77.040.
Haskell, Jacob D., to Advanced Micro Devices, Inc. Method of making self-aligned, planarized contacts for semiconductor devices. 4,977,108, Cl. 437-229.000.
Hata, Masahiko: *See—*
Maeda, Takayoshi; Hata, Masahiko; Zempo, Yasunari; Fukuhara, Noboru; and Takata, Hiroaki, 4,976,216, Cl. 118-728.000.
Hatanaka, Katsunori: *See—*
Shimada, Tetsuya; Itabashi, Satoshi; and Hatanaka, Katsunori, 4,977,096, Cl. 437-2.000.
Hatayama, Satoyuki: *See—*
Arima, Hidetoshi; and Hatayama, Satoyuki, 4,976,069, Cl. 49-497.000.
Hatfield, John. Double hinged cattle stanchion apparatus. 4,976,224, Cl. 119-148.000.
Hatori, Kazuo: *See—*
Nakajima, Makoto; Ohashi, Yoshio; Chuma, Toshio; Hatori, Kazuo; Araki, Isao; Koizumi, Masahiro; Onuki, Jin; Suzuki, Hitoshi; and Okikawa, Susumu, 4,976,393, Cl. 228-111.000.
Hatton, Gregory J.: *See—*
Durrett, Michael G.; Helms, David A.; Hatton, Gregory J.; Dowty, Earl L.; Marrelli, John D.; Stafford, Joseph D.; and Stavish, David J., 4,977,377, Cl. 324-640.000.
Hatton, Kevin B.; Irving, Edward; Walshe, Josephine M. A.; and Mallaband, Anne, to Ciba-Geigy Corporation. Monoethylenically unsaturated compounds. 4,977,293, Cl. 558-153.000.
Hattori, Hideyuki: *See—*
Kato, Eiichi; Ishii, Kazuo; and Hattori, Hideyuki, 4,977,055, Cl. 430-114.000.
Hattori, Yoichi: *See—*
Asakura, Masahiko; Shiraiwa, Kimio; Hattori, Yoichi; and Toume, Naotosi, 4,977,349, Cl. 313-490.000.
Hausermann, Walter; Maurer, Max; and Friedel, Thomas, to Ciba-Geigy Corporation. N-3-(5-trifluoromethylpyridyl-2-oxy)phenyl-N'-benzoylureas for controlling helminths in productive livestock. 4,977,169, Cl. 514-346.000.
Haverstock, Charles B. Skin closure devices. 4,976,726, Cl. 606-216.000.
Hawkins, Raymond R.: *See—*
Lotznicker, Lucio; Hawkins, Raymond R.; Karban, George; Leivenzon, Simon; and Leivenzon, Zvi, 4,976,168, Cl. 74-625.000.
Hayama, Masaharu; Takaoka, Kenji; Torai, Yasushi; and Fukada, Toshiharu, to Nihon Medix Co., Ltd. Cold-air generating device. 4,976,116, Cl. 62-441.000.
Hayashi, Akiharu: *See—*
Fushiya, Fusao; Hayashi, Akiharu; Itsuki, Fumiaki; and Nagata, Kunio, 4,977,358, Cl. 318-268.000.
Hayashi, Kiyotaka; Handa, Etsumi; Yamamoto, Yorihisa; and Tanaka, Hiroshi, to Honda Giken Kabushiki Kaisha. Method for controlling stepless automatic transmission and apparatus therefor. 4,976,170, Cl. 74-866.000.
Hayashi, Kohtaro: *See—*
Mukai, Hiromu; Karasaki, Toshihiko; and Hayashi, Kohtaro, 4,977,424, Cl. 354-410.000.
Hayashi, Takaaki: *See—*
Aoyagi, Sakae; Hayashi, Takaaki; and Kuramoto, Yasuhiro, 4,977,256, Cl. 540-227.000.
Hayashida, Nobuyuki: *See—*
Sakakura, Shigeki; and Hayashida, Nobuyuki, 4,977,428, Cl. 355-245.000.
Hayes, Norman F.: *See—*
Collington, Eric W.; Hallett, Peter; Wallis, Christopher J.; Wadsworth, Alan; and Hayes, Norman F., 4,977,163, Cl. 514-317.000.
Hayet, Pascal: *See—*
Fonsalas, Frederic; Hayet, Pascal; Lejard, Jean-Yves; and Le Queau, Marcel, 4,977,453, Cl. 358-138.000.
Hayman, Michael H.; Morgan, Lee R.; and Liprie, Samuel F. Apparatus for in situ radiotherapy. 4,976,680, Cl. 600-7.000.
Hebert, Edwin D., Sr., to Mud Motors, Inc. Connecting rod assembly for downhole drilling. 4,976,655, Cl. 464-16.000.
Heckel, Bruce G., to Elliott Turbomachinery Co., Inc. Compressor control system to improve turndown and reduce incidents of surging. 4,976,588, Cl. 417-20.000.
Hedlund, Jan-Gunnar; and Asberg, Bengt A., to Sandvik AB. Valve openable in response to displacement of a cutting tool. 4,976,496, Cl. 299-81.000.
Hehl, Karl. Injection molding machine. 4,976,598, Cl. 425-135.000.
Heidelberger Druckmaschinen AG: *See—*
Kipphan, Helmut; and Haase, Josef, 4,976,545, Cl. 356-446.000.
Heidjann, Franz: *See—*
Dammann, Johannes; Heidjann, Franz; and Roderfeld, Heinrich, 4,976,654, Cl. 460-80.000.
Hein, Theo, to Mannesmann Rexroth GmbH. Circuit arrangement for the drive of a vehicle. 4,976,332, Cl. 180-197.000.
Helal, Mohammed A.; and Puckeridge, Larry, to Minitronics Pty Limited. Communication system for single point emergency lighting. 4,977,353, Cl. 315-130.000.
Helene Curtis, Inc.: *See—*
Noe, Jeremy E., 4,976,956, Cl. 424-70.000.
Helferich, Richard L.; and Schenck, Robert C., to Cercona, Inc. Porous ceramic article for use as a filter for removing particulates from diesel exhaust gases. 4,976,760, Cl. 55-487.000.
Helminiak, Thaddeus E.: *See—*
Arnold, Fred E.; Helminiak, Thaddeus E.; Wiff, Donald R.; Tan, Loon S.; Hwang, Wen F.; and Chuah, Hoe, 4,977,223, Cl. 525-432.000.
Helms, David A.: *See—*
Durrett, Michael G.; Helms, David A.; Hatton, Gregory J.; Dowty, Earl L.; Marrelli, John D.; Stafford, Joseph D.; and Stavish, David J., 4,977,377, Cl. 324-640.000.
Helmus, Martin C., to Comp-Aire Systems, Inc. Filtration plenum module constructed for on-site assembly. 4,976,757, Cl. 55-355.000.
Hemming, Leland H. Radio frequency shielding tape. 4,977,296, Cl. 174-35.0MS.
Henderson, Wayne E.: *See—*
Kinnersley, Alan M.; and Henderson, Wayne E., 4,976,767, Cl. 71-26.000.
Hendrikus, Johannes, to Van Doorne's Transmissie B.V. Driving belt, element for such driving belt as well as a method for producing such element. 4,976,663, Cl. 474-242.000.
Henigue, Christian: *See—*
Martine, Robert; and Henigue, Christian, 4,976,801, Cl. 156-245.000.
Henkel Corporation: *See—*
Baldwin, William S.; Willging, Stephen M.; and Siegel, Brock M., 4,977,282, Cl. 549-412.000.
Henkel Kommanditgesellschaft auf Aktien: *See—*
Hoefer, Rainer; Gruetzmacher, Roland; Gress, Wolfgang; and Nagorny, Ulrich, 4,977,207, Cl. 524-507.000.
Jeromin, Lutz; Peukert, Eberhard; Gutsche, Bernhard; Wollmann, Gerhard; and Schleper, Bernard, 4,976,892, Cl. 260-410.700.
Rose, David; Lieske, Edgar; and Maak, Norbert, 4,976,742, Cl. 8-412.000.
Uphues, Guenter; Ploog, Uwe; Becker, Wolfgang; and Goebel, Irmhild, 4,977,294, Cl. 558-208.000.
Wisotzki, Klaus-Dieter; Schumann, Klaus; Engelskirchen, Konard; and Hase, Brigitte, 4,976,885, Cl. 252-174.170.
Hennig, Kurt. Bellows with a minimized compression size. 4,976,193, Cl. 92-261.000.
Henning, Rainer; and Urbach, Hansjorg, to Hoechst Aktiengesellschaft. Intermediates for preparing mono-, bi- and tricyclic amino acids. 4,977,260, Cl. 544-73.000.
Her Majesty the Queen in Right of Canada, as represented by the Minister of National Defence: *See—*
McAndless, John M.; Hancock, James R.; Barnett, Donald B.; Olm, Orville J.; Locke, Terry J. A.; and Maybank, John, 4,976,924, Cl. 422-99.000.
Herbst, Richard L.; Alfrey, Anthony J.; and Streeby, Shawn D., to Spectra-Physics, Inc. Purged cavity solid state tunable laser. 4,977,566, Cl. 372-33.000.
Herman Miller, Inc.: *See—*
Kelley, James O.; Williams, George A.; Kurrasch, Andrew J.; and Hollington, Geoffrey A., 4,976,502, Cl. 312-322.000.
Herman, Zdenek, to CKD Praha, Kombinat. Method for increasing the heat efficiency of a piston combustion engine. 4,976,226, Cl. 123-64.000.
Hermann & Kraemer GmbH & Co. K.G.: *See—*
Hertlein, Ernst; and Herrmann, Anselm, 4,976,408, Cl. 248-446.000.
Hernick, Mark R.: *See—*
Zegel, Douglas R.; Jensen, Gary S.; Hernick, Mark R.; and Daniels, Michael J., 4,976,080, Cl. 52-239.000.
Herrmann, Anselm: *See—*
Hertlein, Ernst; and Herrmann, Anselm, 4,976,408, Cl. 248-446.000.
Herskowitz, Ira: *See—*
Sprague, George; Herskowitz, Ira; Thorner, Jeremy; Julius, David; Blair, Lindley; and Brake, Anthony, 4,977,085, Cl. 435-212.000.
Hertlein, Ernst; and Herrmann, Anselm, to Hermann & Kraemer GmbH & Co. K.G. Device for microfilming bound volumes using a tiltable book cradle. 4,976,408, Cl. 248-446.000.
Herzlinger, Andrei; Shorr, Leonard M.; Antebi, Salomone; Morel-Fisher, Theodor; Utevskii, Lev; and Scheinert, Yaakov, to Bromine Compounds Limited. Trisubstituted symmetrical triazines. 4,977,262, Cl. 544-221.000.
Hess, Mathias C., to Hopper Foundry (1977) Limited, The. Device for raising level of manhole cover. 4,976,568, Cl. 404-26.000.
Hessel, Lasse, to Chartex International plc. Tubular protective device for protection against transfer of infectious matter during sexual intercourse. 4,976,273, Cl. 128-844.000.
Hettel, Hans: *See—*
Haas, Peter; and Hettel, Hans, 4,977,194, Cl. 521-99.000.
Hetzner, Karl G.: *See—*
Schriewer, Michael; Croche, Klaus; Zeiler, Hans-Jonchim; and Hetzner, Karl G., 4,977,263, Cl. 544-329.000.
Hewlett-Packard Company: *See—*
Berg, Thomas E., 4,977,549, Cl. 369-13.000.
Bush, Kevin M., 4,977,514, Cl. 364-487.000.
Ko, Herbert, 4,977,402, Cl. 341-133.000.
Hickner, Richard A.: *See—*
Rao, Nancy A.; and Hickner, Richard A., 4,977,202, Cl. 523-414.000.
Hicks, Thomas W. Fluid directing method and apparatus for aiding the shaping, polishing and smoothing of work piece by sanding. 4,976,072, Cl. 51-266.000.
Hidaka, Hiroaki: *See—*
Iwamoto, Nobuya; Umesaki, Norimasa; Hidaka, Hiroaki; and Haibara, Yukio, 4,976,806, Cl. 156-325.000.

Higson, James R.; D'Alfonso, David A.; and Walls, Robert R., to Mountain Medical Equipment, Inc. Ultrasonic nebulizer. 4,976,259, Cl. 128-200.180.

Higuchi, Naoki: *See*—
Fukami, Harukazu; Higuchi, Naoki; Kawaguchi, Naoko; Hashimoto, Masaki; Ide, Kinya; and Takahashi, Toshio, 4,976,773, Cl. 71-94.000.

Higuchi, Noboru; Kobayashi, Chuzo; Ichikawa, Yasunori; Matsui, Keizo; and Yamaguchi, Shigeru, to Fuji Photo Film Co., Ltd. Liquid and powder measuring apparatus. 4,976,377, Cl. 222-55.000.

Higuchi, Noboru: *See*—
Onishi, Toshitada; Higuchi, Noboru; and Ishii, Itaru, 4,977,039, Cl. 428-623.000.

Hines, Burl D. Marking and cutting device. 4,976,037, Cl. 33-27.030.

Hino, Takashi: *See*—
Kadouchi, Eiji; Matsumoto, Isao; Fujii, Takabumi; Sato, Hiroshi; and Hino, Takashi, 4,977,043, Cl. 429-54.000.

Hinzman, Gary W.: *See*—
Decker, James D.; Burch, Wendell D.; Brady, Daniel F.; Hinzman, Gary W.; Kromrey, Edward P.; Sanville, Katherine M.; Southworth, Donald R.; Chace, Mark S.; and Peloquin, Perry M., 4,976,137, Cl. 73-53.000.

Hipps, Jesse, Sr.: *See*—
Liang, Rong-Chang; Hipps, Jesse, Sr.; and Chen, Jing-Den, 4,977,060, Cl. 430-138.000.

Hirabayashi, Shigeto: *See*—
Ishige, Osamu; Masukawa, Toyoaki; Kida, Shuji; and Hirabayashi, Shigeto, 4,977,073, Cl. 430-549.000.

Hirai, Kentaro: *See*—
Matsumoto, Saichi; Dotenchi, Masami; Mizui, Takuji; and Hirai, Kentaro, 4,977,170, Cl. 514-352.000.

Hirai, Masaru: *See*—
Hisamoto, Iwao; Hirai, Masaru; and Ishikawa, Sueyoshi, 4,976,741, Cl. 8-115.600.

Hirakawa, Nobuhiko; Kashiwaba, Noriaki; Matsumoto, Hajime; Hosoda, Akihiko; Sekine, Yasuo; Isowa, Yoshikazu; Yamura, Tetsuaki; Sekine, Akihiro; and Nishikawa, Masashi, to Fujirebio Kabushiki Kaisha. Intermediates for pyridyloxy compounds having utility as anti-peptic ulcer agents. 4,977,267, Cl. 546-272.000.

Hiraki, Yasuhito: *See*—
Chino, Naoyoshi; Hiraki, Yasuhito; and Sato, Tsunehiko, 4,976,992, Cl. 427-131.000.

Hiranuma, Masahiro: *See*—
Itagaki, Yoko; and Hiranuma, Masahiro, 4,976,921, Cl. 422-28.000.

Hirao, Kouji: *See*—
Okura, Toshihiko; Hirao, Kouji; Watanabe, Tetsuaki; and Kashihara, Kouji, 4,976,508, Cl. 350-96.230.

Hirasawa, Yoji: *See*—
Nakano, Shinji; Tsutsui, Koichi; Ikeda, Shoji; and Hirasawa, Yoji, 4,976,785, Cl. 106-287.170.

Hirata, Akira; and Masumoto, Iwao, to Yamaha Hatsudoki Kabushiki Kaisha. Water cooling means for engine. 4,976,462, Cl. 236-345.000.

Hiratsuka, Yutaka; Ohmi, Tadahiro; Murota, Junichi; Fujisaki, Yoshio; Noda, Masato; Kitada, Yoshimitsu; and Sahara, Terutaka, to Tadahiro, Ohmi; and Hitachi Plant Engineering & Construction Co., Ltd. Draft chamber. 4,976,815, Cl. 156-345.000.

Hirosaki, Toshihiko: *See*—
Takada, Nobuharu; and Hirosaki, Toshihiko, 4,977,363, Cl. 318-771.000.

Hirose, Mitsuo, to NEC Home Electronics Ltd. Video signal reproducing apparatus having setup level elimination. 4,977,460, Cl. 358-336.000.

Hirose, Ryusho, to Canon Kabushiki Kaisha. Projection exposure apparatus. 4,977,426, Cl. 355-53.000.

Hirose, Sumio: *See*—
Sukawa, Hiroshi; Hirose, Sumio; Takahara, Shigeru; and Sasakawa, Tomoyoshi, 4,977,064, Cl. 430-270.000.

Hirsh, Kenneth R.; Schanbacher, Larry M.; and Cha, Alice S., to Kraft General Foods, Inc. Coffee product with reduced malic acid content. 4,976,983, Cl. 426-594.000.

Hisamoto, Iwao; Hirai, Masaru; and Ishikawa, Sueyoshi, to Daikin Industries Ltd. Antistatic agent: mixture of anionic surfactant and a fluorine-containing nonionic surfactant. 4,976,741, Cl. 8-115.600.

Hisanaga, Akinori; Sakubata, Takashi; and Yoshioka, Tetsuo, to Kanegafuchi Kagaku Kogyo Kabushiki Kaisha. Continuous two-liquid type mixer. 4,976,547, Cl. 366-169.000.

Hisanaga, Yorisato: *See*—
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.

Hisano, Junichi: *See*—
Shirakawa, Yoichi; Minowa, Yoshio; Azumi, Takayoshi; and Hisano, Junichi, 4,976,973, Cl. 426-7.000.

Hisashi, Hideyuki: *See*—
Kanamaru, Shinichi; Yoshimura, Shushichi; Hisashi, Hideyuki; and Sakaue, Akinori, 4,976,945, Cl. 423-450.000.

Hitachi Automotive Engineering Co., Ltd.: *See*—
Sano, Yukinori; Kashiwaya, Mineo; and Ikeda, Yuuji, 4,976,243, Cl. 123-492.000.

Hitachi Automotive Engineering, Ltd.: *See*—
Suzuki, Masayoshi; and Horii, Hidesato, 4,977,333, Cl. 307-243.000.

Hitachi Koki Co., Ltd.: *See*—
Oba, Sayoko; Muroi, Katsumi; Okuna, Kenji; Ohtsuka, Hidefumi; Iimura, Tsutomu; Kojima, Ryoji; and Kurihara, Keisuke, 4,977,415, Cl. 346-155.000.

Hitachi, Ltd.: *See*—
Akamatsu, Masuo; and Suzuki, Masayoshi, 4,976,140, Cl. 73-118.200.
Kimura, Tomoaki, 4,976,024, Cl. 29-527.600.
Kobayashi, Shiro; Itoh, Masahiko; and Izumiya, Masakiyo, 4,977,443, Cl. 357-82.000.
Miyaoka, Shuuichi; Odaka, Masanori; and Ogiue, Katsumi, 4,977,338, Cl. 307-446.000.
Nagata, Tatsuya; Yamada, Takehiko; Hara, Eiichi; and Watanabe, Michihiro, 4,977,313, Cl. 250-208.100.
Nakajima, Makoto; Ohashi, Yoshio; Chuma, Toshio; Hatori, Kazuo; Araki, Isao; Koizumi, Masahiro; Onuki, Jin; Suzuki, Hitoshi; and Okikawa, Susumu, 4,976,393, Cl. 228-111.000.
Nakajima, Tadakatsu; Kuwahara, Heikichi; Ohashi, Shigeo; Satoh, Motohiro; Yamada, Toshihiro; Kasai, Kenichi; Kobayashi, Satomi; and Watanabe, Akihide, 4,977,444, Cl. 357-82.000.
Oba, Sayoko; Murci, Katsumi; Okuna, Kenji; Ohtsuka, Hidefumi; Iimura, Tsutomu; Kojima, Ryoji; and Kurihara, Keisuke, 4,977,415, Cl. 346-155.000.
Ogata, Hiromichi; and Yamamoto, Youichi, 4,977,500, Cl. 364-200.000.
Ohtani, Hideya; Momoi, Toshimitsu; Ooi, Eiji; Sakuraba, Shuhei; Morita, Masayuki; and Wakashima, Yoshiaki, 4,977,441, Cl. 357-70.000.
Sano, Yukinori; Kashiwaya, Mineo; and Ikeda, Yuuji, 4,976,243, Cl. 123-492.000.
Shiomi, Makoto; Ohsawa, Michitaka; Sakamoto, Toshiyuki; Matsumi, Kuninori; Ozeki, Kosuke; Yuki, Ikuo; and Sato, Kenji, 4,977,446, Cl. 358-60.000.
Suzuki, Masayoshi; and Horii, Hidesato, 4,977,333, Cl. 307-243.000.
Tajima, Sadayoshi, 4,976,128, Cl. 72-238.000.
Tanaka, Naoyuki; Nakamura, Yozo; Arai, Akira; Nakamura, Mitsuru; Endo, Tsunehiro; and Kadomukai, Yuzo, 4,977,508, Cl. 364-431.080.
Yoshimura, Toshiyuki; Takeda, Eiji; Matsuoka, Hideyuki; and Igura, Yasuo, 4,977,435, Cl. 357-23.500.

Hitachi Metals, Ltd.: *See*—
Oba, Sayoko; Muroi, Katsumi; Okuna, Kenji; Ohtsuka, Hidefumi; Iimura, Tsutomu; Kojima, Ryoji; and Kurihara, Keisuke, 4,977,415, Cl. 346-155.000.
Ohno, Takehiro; and Watanabe, Rikizo, 4,976,791, Cl. 148-404.000.

Hitachi Plant Engineering & Construction Co., Ltd.: *See*—
Hiratsuka, Yutaka; Ohmi, Tadahiro; Murota, Junichi; Fujisaki, Yoshio; Noda, Masato; Kitada, Yoshimitsu; and Sahara, Terutaka, 4,976,815, Cl. 156-345.000.

Hitachi Video Engineering, Inc.: *See*—
Shiomi, Makoto; Ohsawa, Michitaka; Sakamoto, Toshiyuki; Matsumi, Kuninori; Ozeki, Kosuke; Yuki, Ikuo; and Sato, Kenji, 4,977,446, Cl. 358-60.000.

Ho, W. S. Winston: *See*—
Sartori, Guido; and Ho, W. S. Winston, 4,976,868, Cl. 210-640.000.

Hodgson, Alan: *See*—
Ashford, Neil F.; Hodgson, Alan; Blum, Peter M.; and Postle, Stephen R., 4,977,047, Cl. 430-2.000.

Hodogaya Chemical Co., Ltd.: *See*—
Matsumoto, Yuto; Yamaga, Hiroyoshi; Akuzawa, Noboru; and Obara, Toshio, 4,977,249, Cl. 534-696.000.
Motegi, Takeo; Sakuraba, Yasuya; Iguchi, Hiroyuki; and Kasahara, Kaoru, 4,976,768, Cl. 71-76.000.

Hoechst AG: *See*—
Werner, Gerhard, 4,976,783, Cl. 106-20.000.

Hoechst Aktiengesellschaft: *See*—
Gersdorf, Joachim; and Kleiner, Hans-Jerg, 4,977,066, Cl. 430-277.000.
Henning, Rainer; and Urbach, Hansjorg, 4,977,260, Cl. 544-73.000.
Krakkay, Tibor; Poggi, Tatjana; and Schubert, Ernst, 4,977,225, Cl. 526-93.000.
Leupold, Ernst I., 4,976,893, Cl. 260-413.000.
Leupold, Ernst I.; Wiesner, Matthias; Schlingmann, Merten; and Rapp, Knut, 4,977,283, Cl. 549-484.000.
Schaefer, Eckhard, 4,977,019, Cl. 428-317.500.
Schwabe, Karl D., 4,977,027, Cl. 428-423.900.
Wess, Gunther; Kesseler, Kurt; Baader, Ekkehard; and Beck, Gerhard, 4,977,279, Cl. 549-274.000.

Hoechst Celanese Corporation: *See*—
Callahan, Robert W.; and Reed, Bradley W., 4,976,867, Cl. 210-637.000.
Callahan, Robert W.; and Johnson, Richard D., 4,976,897, Cl. 264-22.000.
Diaddario, Leonard L., Jr.; and Schroeder, Mark A., 4,976,835, Cl. 204-92.000.
Giniewicz, Jayne R.; Newnham, Robert E.; Cross, Leslie E.; and Safari, Ahmad, 4,977,547, Cl. 367-157.000.
Gooch, Jan W., 4,977,021, Cl. 428-329.000.
Kalyanaraman, Palaiyur S., 4,977,068, Cl. 430-495.000.

Hoefer, Rainer; Gruetzmacher, Roland; Gress, Wolfgang; and Nagorny, Ulrich, to Henkel Kommanditgesellschaft auf Aktien. Water dilutable leverler coating compositions. 4,977,207, Cl. 524-507.000.

Hoefler, Raphael A. Easily emptied food can. 4,976,367, Cl. 220-260.000.

Hoerner, Rebecca S.: *See*—
Short, William T.; and Hoerner, Rebecca S., 4,976,896, Cl. 264-1.900.

Hoffenberg, Mark J.: *See*—
Sargeant, Bruce A.; Hoffenberg, Mark J.; Reasons, Rob; and Walpert, Robert A., 4,976,424, Cl. 272-73.000.

Hoffman, Wolfgang, to B & H Manufacturing Company, Inc. System for applying heat shrink film to containers and other articles and heat shrinking the same. 4,977,002, Cl. 428-34.700.
Hoffman, Wolfgang W., to Shibuya America Corporation. Method of applying a plastic wrap to a contoured container. 4,976,798, Cl. 156-85.000.
Hoffmann-La Roche Inc.: *See—*
Hofheinz, Werner; Schmid, Gerard; and Stohler, Harro, 4,977,184, Cl. 514-452.000.
Jolidon, Synese; Locher, Rita; Kompis, Ivan; Weiss, Ekkehard; and Wyss, Pierre-Charles, 4,977,265, Cl. 544-363.000.
Hofheinz, Werner; Schmid, Gerard; and Stohler, Harro, to Hoffmann-La Roche Inc. Bicyclic peroxides compositions for and treatment of malaria therewith. 4,977,184, Cl. 514-452.000.
Hogan, Mark R., to Carrier Corporation. Cambered condenser grill. 4,976,115, Cl. 62-428.000.
Holborow, Peter; and Kramer, Gary, to Automatic Switch Company. Four-way slide valve. 4,976,286, Cl. 137-625.430.
Holcomb, Don R., Sr.; Brown, Mark J.; and Schumacher, Lawrence R., to Motorola, Inc. Fine tuning frequency synthesizer with feedback loop for frequency control systems. 4,977,613, Cl. 455-182.000.
Holfert, John W.; and Olsen, Donald B., to University of Utah Research Foundation. Elliptical artificial heart. 4,976,729, Cl. 623-3.000.
Holgersson, Lennart. Mill. 4,976,471, Cl. 241-73.000.
Holland, Gordon A., to Delaware Capital Formation, Inc. Leveling control system for hydraulic elevator. 4,976,338, Cl. 187-110.000.
Hollington, Geoffrey A.: *See—*
Kelley, James O.; Williams, George A.; Kurrasch, Andrew J.; and Hollington, Geoffrey A., 4,976,502, Cl. 312-322.000.
Holloman, Miles E.; Jordan, Debbee J.; and Otto, William F., to United States of America, Army. Power transmission device. 4,976,789, Cl. 136-246.000.
Holloway, Brian R.; Howe, Ralph; Rao, Balbir S.; and Stribling, Donald, to Imperial Chemical Industries. Amide derivatives. 4,977,148, Cl. 514-183.000.
Holloway, William G.: *See—*
Cross, David C.; and Holloway, William G., 4,976,476, Cl. 292-92.000.
Hollowed, Edward J.; and Oldani, Jerome L., to GTE Airfone Incorporated. Dispenser and unlatching mechanism for a hand-held pay station telephone. 4,977,592, Cl. 379-428.000.
Holzmann, Gottfried: *See—*
Maucksch, Thomas; Holzmann, Gottfried; and Korber, Frank, 4,977,607, Cl. 455-10.000.
Homer, Nigel J.; Jackson, Graham; Sankey, George H.; and Simpson, Philip J., to Tate & Lyle PLC. Process for the chlorination of sugars. 4,977,254, Cl. 536-124.000.
Homsy, Charles A.: *See—*
Griffith, Donald P.; and Homsy, Charles A., 4,976,735, Cl. 623-12.000.
Honda Giken Kabushiki Kaisha: *See—*
Hayashi, Kiyotaka; Handa, Etsumi; Yamamoto, Yorihisa; and Tanaka, Hiroshi, 4,976,170, Cl. 74-866.000.
Honda Giken Kogyo K.K. (Honda Motor Co., Ltd.): *See—*
Ide, Yutaka, 4,976,589, Cl. 417-34.000.
Honda Giken Kogyo Kabushiki Kaisha: *See—*
Ashikawa, Noboru; and Yumoto, Toshiyuki, 4,976,668, Cl. 475-221.000.
Fujita, Haruyasu, 4,976,452, Cl. 280-293.000.
Horiuchi, Makoto; Shimizu, Atsushi; Miyakawa, Yoshitaka; and Sakurai, Kazuya, 4,976,105, Cl. 60-413.000.
Murayama, Junichi; Iiyama, Kazuto; Toyama, Niichi; Sadamitsu, Katsushi; and Takashima, Hideki, 4,977,000, Cl. 427-424.000.
Sasajima, Koji; and Ishikawa, Yoshikazu, 4,976,169, Cl. 74-866.000.
Tanaka, Kouji; Kondo, Syugo; Imura, Takeshi; Ando, Katsuhiko; and Nakabayashi, Shigemitsu, 4,976,305, Cl. 164-458.000.
Honda, Michitaka, to Kabushiki Kaisha Toshiba. X-ray image processing apparatus. 4,977,587, Cl. 378-99.000.
Honda, Naoki, to Nissan Motor Co., Ltd. Vacuum evaporation method for zinc sulfide. 4,976,988, Cl. 427-42.000.
Honigsbaum, Richard F. Antitank-antipersonnel weapon. 4,976,202, Cl. 102-367.000.
Honjo, Toshio; Sato, Yuji; Fukushima, Yoshihiro; Nawa, Masayoshi; and Yasuda, Shinichiro, to Kao Corporation; and Nippon Iron Powder Co. Ltd. Developer for electrostatic image comprising coated carrier. 4,977,054, Cl. 430-108.000.
Honore, Tage: *See—*
Jacobsen, Poul; Nielsen, Flemming E.; Honore, Tage; and Drejer, Jorgen, 4,977,155, Cl. 514-250.000.
Hood, Clarence E.: *See—*
Williamson, Robert E.; McHugh, Carl M.; and Hood, Clarence E., 4,976,094, Cl. 56-330.000.
Hood, James E. Variable speed transmissions. 4,976,658, Cl. 474-49.000.
Hopper Foundry (1977) Limited, The: *See—*
Hess, Mathias C., 4,976,568, Cl. 404-26.000.
Hori, Katsuya: *See—*
Furuya, Tsuneo; Furkawa, Shunsuke; and Hori, Katsuya, 4,977,550, Cl. 369-32.000.
Hori, Kazunobu: *See—*
Asai, Keiichi; Mochizuki, Chizuko; and Hori, Kazunobu, 4,976,488, Cl. 296-155.000.
Hori, Yasuhiro: *See—*
Okuhara, Masakuni; Goto, Toshio; Hori, Yasuhiro; Fujita, Takashi; Ueda, Hirotsugu; and Shigematsu, Nobuharu, 4,977,138, Cl. 514-10.000.
Horiba, Ltd.: *See—*
Motoi, Yoshihiko; Yamamoto, Naoki; and Takano, Yukio, 4,977,307, Cl. 219-392.000.
Horii, Hidesato: *See—*
Suzuki, Masayoshi; and Horii, Hidesato, 4,977,333, Cl. 307-243.000.
Horii, Yukio: *See—*
Umemori, Noboru; Kouda, Osamu; and Horii, Yukio, 4,976,289, Cl. 138-122.000.
Horikawa, Kazuo; Okada, Kouichi; and Miyagawa, Ichirou, to Fuji Photo Film Co., Ltd. Beam-combining laser beam source device. 4,976,527, Cl. 350-588.000.
Horikoshi, Katsumi: *See—*
Iwasaki, Takao; Horikoshi, Katsumi; and Yoshiji, Yuzo, 4,976,825, Cl. 203-71.000.
Horinouchi, Kazuo; and Maeda, Katsuya, to Sumitomo Chemical Company, Limited. Zirconia ceramics and method for producing same. 4,977,114, Cl. 501-104.000.
Horita, Yoshiyuki: *See—*
Terada, Yasuharu; Horita, Yoshiyuki; Ishii, Susumu; and Wake, Kiyoyasu, 4,976,120, Cl. 70-68.000.
Horiuchi, Makoto; Shimizu, Atsushi; Miyakawa, Yoshitaka; and Sakurai, Kazuya, to Nissin Kogyo Kabushiki Kaisha; and Honda Giken Kogyo Kabushiki Kaisha. Hydraulic booster system with accumulator. 4,976,105, Cl. 60-413.000.
Horl, Manfred L. A., to U.S. Philips Corp. Stereo receiver circuit. 4,977,597, Cl. 381-11.000.
Hornback, Donald L.: *See—*
Yoder, Douglas J.; Brown, Ronald E.; Stevenson, Paul E.; Hornback, Donald L.; and Leisure, Ronald K., 4,977,101, Cl. 437-51.000.
Horrobin, David F., to Efamol Holdings PLC. Treating schizophrenia with essential fatty acid compositions. 4,977,187, Cl. 514-560.000.
Hosaka, Akio, to Nissan Motor Company, Limited. Throttle control system with noise-free accelerator position input. 4,976,239, Cl. 123-399.000.
Hoshi, Kouichi: *See—*
Sonoda, Yukihiro; Osawa, Kouichi; Kanai, Hiroshi; Hoshi, Kouichi; Matsuoka, Hiroki; Ohashi, Michihiro; and Sawada, Hiroshi, 4,976,242, Cl. 123-489.000.
Hoshi, Satoshi: *See—*
Ohno, Shigeru; Kitatani, Katsuji; Makino, Naonori; Hoshi, Satoshi; and Sato, Hideo, 4,977,051, Cl. 430-58.000.
Hoshiko, Tomonori: *See—*
Oinuma, Hitoshi; Yamanaka, Motosuke; Miyake, Kazutoshi; Hoshiko, Tomonori; Minami, Norio; and Shoji, Tadao, 4,977,165, Cl. 514-318.000.
Hosie, Stanley; and Araujo, Luis A. G., to Vetco Gray Inc. Internal tieback connector. 4,976,458, Cl. 285-24.000.
Hosoda, Akihiko: *See—*
Hirakawa, Nobuhiko; Kashiwaba, Noriaki; Matsumoto, Hajime; Hosoda, Akihiko; Sekine, Yasuo; Isowa, Yoshikazu; Yamura, Tetsuaki; Sekine, Akihiro; and Nishikawa, Masashi, 4,977,267, Cl. 546-272.000.
Hosoda, Masahiro: *See—*
Yamamoto, Saburo; Hosoda, Masahiro; Sasaki, Kazuaki; and Kondo, Masaki, 4,977,568, Cl. 372-46.000.
Hosono, Masami: *See—*
Miyabayashi, Nobuyoshi; Hosono, Masami; and Abe, Atsushi, 4,977,533, Cl. 364-726.000.
Hosoya, Yoshio; Watanabe, Naotaka; Takagi, Isao; and Miyoshi, Atsuo, to Mitsui-Cyanamid, Ltd. Water-absorbent coating compositions. 4,977,208, Cl. 524-515.000.
Hosten, Daniel, to Siemens Aktiengesellschaft. Electroplating apparatus for plate-shaped workpieces. 4,976,840, Cl. 204-202.000.
Hotta, Yoshihiko; and Kubo, Keishi, to Ricoh Co., Ltd. Reversible thermosensitive recording materials. 4,977,030, Cl. 428-447.000.
Hotten, Terrence M.: *See—*
Chakrabarti, Jiban Kumar; and Hotten, Terrence M., 4,977,150, Cl. 514-220.000.
Hotzman, Frederick W.: *See—*
Barnes, Keith D.; Hotzman, Frederick W.; Limpel, Lawrence E.; and Magee, Thomas A., 4,976,770, Cl. 71-88.000.
Houck, David L.: *See—*
Anand, Vidhu; Houck, David L.; and Smouse, Dennis C., 4,976,948, Cl. 423-607.000.
Houghteling, Barbara. Baby bootie. 4,976,050, Cl. 36-9.00R.
Houghten, Richard: *See—*
Shinnick, Thomas; and Houghten, Richard, 4,976,958, Cl. 424-92.000.
Houghton, Peter G.; and Wright, Stanley H. B., to Merck, Sharp & Dohme Ltd. Benzoxazepinone process. 4,977,258, Cl. 540-548.000.
Hovarter, Len A., to General Motors Corporation. Reed valve for piston machine. 4,976,284, Cl. 137-512.400.
Howard, Harry R., Jr.; and Sarges, Reinhard, to Pfizer Inc. Method of treating anxiety and depression with 1-phenyl-2(1H,3H)-indolone psycho-therapeutic agents. 4,977,178, Cl. 514-418.000.
Howe, Ralph: *See—*
Holloway, Brian R.; Howe, Ralph; Rao, Balbir S.; and Stribling, Donald, 4,977,148, Cl. 514-183.000.
Howe, Stephen E.: *See—*
Brown, Jacqueline L.; Howe, Stephen E.; and Hultman, Sheryl L., 4,977,029, Cl. 428-429.000.
Howmedica International, Inc.: *See—*
Richter, Karl M.; and Vecsei, Vilmos, 4,976,258, Cl. 606-64.000.
Hoya Corporation: *See—*
Fujino, Takuo, 4,976,764, Cl. 65-30.100.

Itagaki, Yoko; and Hiranuma, Masahiro, 4,976,921, Cl. 422-28.000.
Hoying, Richard C.: *See—*
Eckrich, Thomas M.; and Hoying, Richard C., 4,977,257, Cl. 540-205.000.
Hrinda, Michael E.: *See—*
Lee, Ted C. K.; and Hrinda, Michael E., 4,977,246, Cl. 530-383.000.
Hsia, James C.: *See—*
Furumoto, Horace W.; Ceccon, Harry L.; and Hsia, James C., 4,977,571, Cl. 372-54.000.
Hsieh, Wu H. Means for regulating cymbal pedal tightness. 4,976,181, Cl. 84-422.300.
Huang, Fu-Chih; Campbell, Henry F.; Learn, Keith S.; and Galemmo, Robert A., Jr., to Rorer Pharmaceutical Corporation. Quinolinylchromone derivatives and use for treatment of hypersensitive ailments. 4,977,162, Cl. 514-314.000.
Huang, Jyh C., to Tatung Company of America, Inc. Snap-together housing for small appliances. 4,976,753, Cl. 55-124.000.
Hudgens, Bernard C.: *See—*
Venable, Frederick D.; and Hudgens, Bernard C., 4,976,167, Cl. 74-533.000.
Huels Aktiengesellschaft: *See—*
Ripke, Norbert, 4,977,253, Cl. 536-118.000.
Huffman, Dennis D.; Hughes, Robert C.; Kelsey, Charles A.; Lane, Richard; Ricco, Antonio J.; Snelling, Jay B.; and Zipperian, Thomas E., to United States of America, Energy. Methods of in vivo radiation measurement. 4,976,266, Cl. 128-659.000.
Hughes Aircraft Company: *See—*
Dougherty, Thomas K.; Oldham, Susan L.; and Elias, William E., 4,977,220, Cl. 525-332.300.
Eckhardt, Wilfred O.; Williamson, Weldon S.; Hancock, Donald J.; and Robson, Ronald R., 4,977,329, Cl. 250-551.000.
Gabaldon, John B.; and Evans, Daniel D., Jr., 4,977,494, Cl. 364-167.010.
Larson, Lawrence E., 4,977,403, Cl. 341-143.000.
Ludwig, Frank A., 4,977,044, Cl. 429-104.000.
Williamson, Weldon S., 4,977,352, Cl. 315-111.810.
Hughes, Anthony H.; and Topham, Arthur, to Baxenden Chemical Co., The. Blocked isocyanates. 4,976,837, Cl. 204-181.700.
Hughes, Linda B. Turtleneck bib. 4,975,982, Cl. 2-49.00R.
Hughes, Robert C.: *See—*
Huffman, Dennis D.; Hughes, Robert C.; Kelsey, Charles A.; Lane, Richard; Ricco, Antonio J.; Snelling, Jay B.; and Zipperian, Thomas E., 4,976,266, Cl. 128-659.000.
Hull, Vickie D. Medicine pal apparatus. 4,976,646, Cl. 446-74.000.
Hultberg, Jimmy, to AB Volvo. Method for transferring articles. 4,976,344, Cl. 198-418.200.
Hultman, Sheryl L.: *See—*
Brown, Jacqueline L.; Howe, Stephen E.; and Hultman, Sheryl L., 4,977,029, Cl. 428-429.000.
Hung, Hsi-Chiang. Multipurpose tool. 4,976,175, Cl. 81-439.000.
Huni, Jean-Paul R.: *See—*
Boivin, Richard F.; Huni, Jean-Paul R.; and LeBlanc, Robert, 4,976,841, Cl. 204-243.00M.
Hunter Engineering Company: *See—*
Strege, Timothy A.; and Schmieley, Donald A., 4,977,524, Cl. 364-562.000.
Hurd, William J.: *See—*
Darsey, Ralph J.; and Hurd, William J., 4,976,596, Cl. 425-117.000.
Huser, Diane L.; and Schaus, John M., to Eli Lilly and Company. BCD tricyclic ergoline part-structure analogues. 4,977,160, Cl. 514-293.000.
Husky Injection Molding Systems, Ltd.: *See—*
Disimone, John, 4,976,603, Cl. 425-556.000.
Hutchinson: *See—*
Simon, Jean-Michel; Taniere, Jacques; Ciolczyk, Jean-Pierre; and Domer, Michel, 4,976,412, Cl. 248-634.000.
Hutchison, Alan J.: *See—*
Fujimoto, Roger A.; Francis, John E.; and Hutchison, Alan J., 4,977,144, Cl. 514-46.000.
Hutterman, Aloys; Majcherczyk, Andrzej; and Zadrazil, Frantisek. Process for the treatment of oxygenated exhaust gases. 4,977,090, Cl. 435-266.000.
Hwa, Chih M.; Kelly, John A.; and Adhya, Mita, to W. R. Grace & Co.-Conn. 4-phosphonomethyl-2-hydroxy-2-oxo-1,4,2-oxazaphosphorinane N-oxide and water-soluble salts thereof. 4,977,292, Cl. 558-81.000.
Hwang, Feng-Lin. Cleaning device for armrest belt of the escalator. 4,976,342, Cl. 198-495.000.
Hwang, Wen F.: *See—*
Arnold, Fred E.; Helminiak, Thaddeus E.; Wiff, Donald R.; Tan, Loon S.; Hwang, Wen F.; and Chuah, Hoe, 4,977,223, Cl. 525-432.000.
Hwo, Charles C.; and Mostert, Simone, to Shell Oil Company. Modified polybutylene-based hot melt compositions. 4,977,206, Cl. 524-504.000.
Hyde, King W. Ignitor device. 4,976,608, Cl. 431-202.000.
Hyde, Paul: *See—*
Pitchford, Gary; Pitchford, Steve; and Hyde, Paul, 4,977,509, Cl. 364-449.000.
Ian Wilson Technology Limited: *See—*
Wilson, Alexander I., 4,976,125, Cl. 72-21.000.
Ibat Ullin, Rustam K.: *See—*
Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A., 4,976,322, Cl. 175-57.000.
Ibe, Hiroyuki; and Yamakawa, Hideaki, to Kabushiki Kaisha Toshiba. Oscillation mode switching laser devices. 4,977,561, Cl. 372-23.000.
Ichikawa, Fumihiko; and Ohki, Toshio, to Kawasaki Steel Corporation. Ultrasonic distance sensor and monitoring of surface profile utilizing ultrasonic distance sensor. 4,976,149, Cl. 73-597.000.
Ichikawa, Yasunori; Yamaguchi, Shigeru; Ohnishi, Hiroshi; Kojima, Akira; and Kato, Akira, to Fuji Photo Film Co., Ltd. Flow control valve. 4,976,404, Cl. 251-121.000.
Ichikawa, Yasunori: *See—*
Higuchi, Noboru; Kobayashi, Chuzo; Ichikawa, Yasunori; Matsui, Keizo; and Yamaguchi, Shigeru, 4,976,377, Cl. 222-55.000.
Ichimura, Isao, to Sony Corporation. Dropout detecting circuit with one-half wavelength delay. 4,977,461, Cl. 358-336.000.
Ichinose, Katsuki: *See—*
Anami, Kenji; and Ichinose, Katsuki, 4,977,538, Cl. 365-230.030.
Ichitou, Toshikatsu: *See—*
Takanashi, Itsuo; Ichitou, Toshikatsu; Kitamura, Hiroki; Yamamura, Takashi; Sakagami, Koubun; and Nakano, Atsushi, 4,977,417, Cl. 346-160.000.
ICI Americas Inc.: *See—*
Baker, Don R.; and Brownell, Keith H., 4,977,164, Cl. 514-318.000.
Wee, Siok-Hui H., 4,977,270, Cl. 548-314.000.
ICP France: *See—*
Landanger, Joel; and Michel, Jean P., 4,976,713, Cl. 606-62.000.
Ide, Kinya: *See—*
Fukami, Harukazu; Higuchi, Naoki; Kawaguchi, Naoko; Hashimoto, Masaki; Ide, Kinya; and Takahashi, Toshio, 4,976,773, Cl. 71-94.000.
Ide, Yutaka, to Honda Giken Kogyo K.K. (Honda Motor Co., Ltd.). Output control system for an I.C. engine responsive to compressor torque and engine speed. 4,976,589, Cl. 417-34.000.
Idemitsu Kosan Company Limited: *See—*
Matsuo, Shigeru; Murakami, Tomoyoshi; Bando, Thoru; and Nagatoshi, Kikuo, 4,977,234, Cl. 528-211.000.
Idemitsu Petrochemical Co., Ltd.: *See—*
Okamoto, Masaya; and Kurokawa, Hiroshi, 4,977,233, Cl. 528-198.000.
Idler, Siegfried: *See—*
Scheck, Werner; Idler, Siegfried; and Furrer, Bernard, 4,976,543, Cl. 356-375.000.
IDX, Inc.: *See—*
Juds, Scott; Halsey, Johnny H.; and Halsey, James H., 4,976,346, Cl. 194-200.000.
Igarashi, Tsutomu, to Olympus Optical Co., Ltd. Objective lens system for endoscopes. 4,976,522, Cl. 350-426.000.
Ige, Hitoshi: *See—*
Sasaki, Isao; Mukai, Nobuhiro; and Ige, Hitoshi, 4,977,197, Cl. 522-14.000.
Ignatius, Timothy: *See—*
Walder, Anthony J.; Solomon, Donald D.; Beck, Richard W.; Lambert, James M.; Ignatius, Timothy; and Crawford, Mark, 4,976,697, Cl. 604-164.000.
Iguchi, Hiroyuki: *See—*
Motegi, Takeo; Sakuraba, Yasuya; Iguchi, Hiroyuki; and Kasahara, Kaoru, 4,976,768, Cl. 71-76.000.
Iguchi, Kazuo; Soejima, Tetsuo; Watanabe, Toshiaki; and Amemiya, Shigeo, to Fujitsu Limited. Demultiplexing device of synchronous multiplexing system. 4,977,558, Cl. 370-112.000.
Iguchi, Kazuo: *See—*
Nebashi, Tsutomu; Iguchi, Kazuo; and Murata, Moriyasu, 4,977,204, Cl. 524-186.000.
Igura, Yasuo: *See—*
Yoshimura, Toshiyuki; Takeda, Eiji; Matsuoka, Hideyuki; and Igura, Yasuo, 4,977,435, Cl. 357-23.500.
Ihama, Mikio; Kume, Yuji; Tamoto, Koji; Takehara, Hiroshi; and Arai, Masao, to Fuji Photo Film Co., Ltd. Silver halide photographic emulsion. 4,977,075, Cl. 430-567.000.
Iida, Hiroshi: *See—*
Yamanaka, Akihiro; Iida, Hiroshi; and Nozawa, Minoru, 4,977,413, Cl. 346-140.00R.
Iijima, Takahiro: *See—*
Maeda, Keikichi; Kagawa, Naohiko; Ishii, Kunio; and Iijima, Takahiro, 4,976,932, Cl. 422-240.000.
Iijima, Toshifumi; Yamada, Yoshitaka; Kumashiro, Kenji; Akamatsu, Hideo; and Kamio, Takashi, to Konishiroku Photo Industry Co., Ltd. Silver halide color photographic light sensitive material. 4,977,069, Cl. 430-506.000.
Iikura, Shoichi: *See—*
Suzumori, Koichi; Matsumaru, Takafumi; and Iikura, Shoichi, 4,976,191, Cl. 92-48.000.
Iimura, Tsutomu: *See—*
Oba, Sayoko; Muroi, Katsumi; Okuna, Kenji; Ohtsuka, Hidefumi; Iimura, Tsutomu; Kojima, Ryoji; and Kurihara, Keisuke, 4,977,415, Cl. 346-155.000.
Iiyama, Kazuto: *See—*
Murayama, Junichi; Iiyama, Kazuto; Toyama, Niichi; Sadamitsu, Katsushi; and Takashima, Hideki, 4,977,000, Cl. 427-424.000.
Iizuka, Nobuo: *See—*
Hashimoto, Kiroyuki; Iizuka, Nobuo; and Suzuki Akira, 4,977,608, Cl. 425-62.000.
Iizuka, Shigeo; and Saito, Tadao, to Yoshino Kogyosho Co., Ltd. Container type toilet implement with air escape passage. 4,976,563, Cl. 401-176.000.

Ikebe, Masaru: *See—*
Shiba, Haruo; and Ikebe, Masaru, 4,977,475, Cl. 360-133.000.

Ikeda Bussan Co., Ltd.: *See—*
Yanagishita, Norio, 4,976,414, Cl. 264-40.300.

Ikeda, Shoji: *See—*
Nakano, Shinji; Tsutsui, Koichi; Ikeda, Shoji; and Hirasawa, Yoji, 4,976,785, Cl. 106-287.170.

Ikeda, Tatsufumi: *See—*
Suzuki, Junji; Ishida, Tatsuya; Toda, Kazuya; Ikeda, Tatsufumi; Tsukidate, Yokichi; and Yasuo, Kikuchi, 4,977,171, Cl. 514-365.000.

Ikeda, Tetsuo: *See—*
Arai, Mitsuhiro; Tsuchiya, Eiichi; and Ikeda, Tetsuo, 4,977,473, Cl. 360-130.240.

Ikeda, Yuuji: *See—*
Sano, Yukinori; Kashiwaya, Mineo; and Ikeda, Yuuji, 4,976,243, Cl. 123-492.000.

Ikezawa, Mamoru: *See—*
Tashiro, Koichi; Ikezawa, Mamoru; Sano, Takashi; Matsuura, Kosei; and Nakatani, Hajime, 4,976,438, Cl. 273-313.000.

Ikuta, Kunio, to Dainippon Screen Mfg. Co., Ltd. Method of producing halftone images by choosing a conversion function based on virtual and reference solid pixels. 4,977,464, Cl. 358-448.000.

Ilford Limited: *See—*
Ashford, Neil F.; Hodgson, Alan; Blum, Peter M.; and Postle, Stephen R., 4,977,047, Cl. 430-2.000.
Wood, Glenn P., 4,976,799, Cl. 156-106.000.

Illi, Heikki: *See—*
Selin, Lauri; Aaltonen, Pertti; and Illi, Heikki, 4,976,844, Cl. 204-408.000.

Illinois Tool Works Inc.: *See—*
Cargould, Barry D.; and Beebe, James C., 4,976,141, Cl. 73-146.000.
Frano, Frank, 4,976,017, Cl. 24-585.000.

Ilmasti Elektroniikka Oy: *See—*
Ilmasti, Veikko; and Graeff, Thor G., 4,977,318, Cl. 250-253.000.

Ilmasti, Veikko; and Graeff, Thor G., to Ilmasti Elektroniikka Oy. Procedure and means for measuring radon content in the air. 4,977,318, Cl. 250-253.000.

Imatron, Inc.: *See—*
Boyd, Douglas P., 4,977,585, Cl. 378-4.000.

Imperial Chemical Industries: *See—*
Holloway, Brian R.; Howe, Ralph; Rao, Balbir S.; and Stribling, Donald, 4,977,148, Cl. 514-183.000.

Imperial Chemical Industries PLC: *See—*
Anthony, Vivienne M.; Clough, John M.; and Godfrey, Christopher R. A., 4,976,771, Cl. 71-90.000.
Bradbury, Roy; Gemmell, Peter A.; and Hann, Richard A., 4,977,135, Cl. 503-227.000.
Dewar, Colin A.; and Artus, Kevin J., 4,977,015, Cl. 428-221.000.
Gillis, Herbert R., 4,977,195, Cl. 521-155.000.

Imura, Takeshi: *See—*
Tanaka, Kouji; Kondo, Syugo; Imura, Takeshi; Ando, Katsuhiko; and Nakabayashi, Shigemitsu, 4,976,305, Cl. 164-458.000.

Ina Walzlager Schaeffler KG: *See—*
Breindl, Werner, 4,976,660, Cl. 474-135.000.

Inada, Hiromasa: *See—*
Sugimori, Teruhiko; Suzuki, Fumio; Habara, Hideaki; and Inada, Hiromasa, 4,977,241, Cl. 528-497.000.

Inagaki, Hiroyuki: *See—*
Suzuki, Sadakatsu; Inagaki, Hiroyuki; and Ueno, Hiroshi, 4,977,284, Cl. 549-508.000.

Inagaki, Yasuro, to Brother Kogyo Kabushiki Kaisha. Typewriter. 4,976,559, Cl. 400-691.000.

Inai, Masatoshi: *See—*
Nakamura, Shizuo; Inai, Masatoshi; Inoue, Makoto; Nagao, Kazushi; and Tsuda, Yoshiaki, 4,977,179, Cl. 514-423.000.

Industrial Technology Research Institute: *See—*
Liu, Ru-Shi, 4,977,109, Cl. 505-1.000.

Inertia Dynamics Corporation: *See—*
Everts, Robert G., 4,976,093, Cl. 56-11.300.

Ingles, Harrison D., Jr.: *See—*
Banning, William L.; and Ingles, Harrison D., Jr., 4,977,499, Cl. 364-200.000.

Inkmann, Mark S.: *See—*
Abujudom, David N., II; Dougherty, Thomas J.; Inkmann, Mark S.; Johnson, Richard T.; Karolek, Neil C.; and Saari, David W., 4,976,327, Cl. 180-68.200.

Ino, Masumitsu; Kohata, Mitsuhiro; Itagaki, Masanori; Nagata, Takehito; and Tanaka, Hiroyuki, to Ricoh Company Ltd.; and Ricoh Research Institute of General Electronics Co., Ltd. Linear solid state image sensor. 4,977,304, Cl. 250-208.100.

Inomata, Kenichi: *See—*
Nakajima, Nobuyuki; Inomata, Kenichi; Okada, Shigeru; and Eitai, Kazuo, 4,976,592, Cl. 417-295.000.

Inoue Japax Incorporated: *See—*
Inoue, Kiyoshi; and Shimizu, Akihiko, 4,977,396, Cl. 340-706.000.

Inoue, Kiyoshi; and Shimizu, Akihiko, to Inoue Japax Incorporated. Machining parameter selective setting display apparatus for electroerosion machines. 4,977,396, Cl. 340-706.000.

Inoue, Makoto: *See—*
Nakamura, Shizuo; Inai, Masatoshi; Inoue, Makoto; Nagao, Kazushi; and Tsuda, Yoshiaki, 4,977,179, Cl. 514-423.000.

Inoue, Minoru, to Fujitsu Limited. Method of forming a barrier layer between a silicon substrate and an aluminum electrode of a semiconductor device. 4,976,839, Cl. 204-192.170.

Inoue, Nobuaki: *See—*
Yagihara, Morio; Okada, Hisashi; Katoh, Kazunobu; and Inoue, Nobuaki, 4,977,062, Cl. 430-264.000.

Inoue, Takashi: *See—*
Akazawa, Toshiyuki; Okaya, Takuji; Inoue, Takashi; and Kobayashi, Toshitaka, 4,977,212, Cl. 525-57.000.

Insight Telecast, Inc.: *See—*
Young, Patrick, 4,977,455, Cl. 358-142.000.

Institut Francais du Petrole: *See—*
Denis, Jacques; Montagne, Xavier; Mulard, Philippe; and Eber, Daniele, 4,976,746, Cl. 44-330.000.
Dufresne, Pierre; Franck, Jean-Pierre; Raatz, Francis; and Travers, Christine, 4,977,121, Cl. 502-66.000.

Intel Corporation: *See—*
Leonov, Mark; and de Groot, Roy, 4,976,002, Cl. 15-304.000.

Inter-City Products Corporation (USA): *See—*
Lynch, Gregory A., 4,976,459, Cl. 236-11.000.

Interferon Sciences, Inc.: *See—*
Koulin, Ge; Yunzhu, Wang; Xunmei, Yuan; and Peiming, Huang, 4,977,087, Cl. 435-240.470.

International Business Machines Corporation: *See—*
Bahl, Lalit R.; DeSouza, Peter V.; Mercer, Robert L.; and Picheny, Michael A., 4,977,599, Cl. 381-43.000.
Banning, William L.; and Ingles, Harrison D., Jr., 4,977,499, Cl. 364-200.000.
Dibble, Eric P.; and Knight, Alan D., 4,976,626, Cl. 439-67.000.
McGaughey, Harry S., III; Melkus, Lovie A.; and Torres, Robert J., 4,977,520, Cl. 364-521.000.

International Financial Associates Holdings, Inc.: *See—*
Vorosmarthy, 4,976,732, Cl. 623-6.000.

International Fuel Cells Corporation: *See—*
Szydlowski, Donald F.; and Lesieur, Roger R., 4,976,747, Cl. 48-127.900.

Interpore International: *See—*
White, Eugene W.; and Shors, Edwin C., 4,976,736, Cl. 623-16.000.

Intevep, S.A.: *See—*
Rivas, Olegario; Newski, Alejandro; and Antunez, Simon, 4,976,591, Cl. 417-254.000.

Ionics, Incorporated: *See—*
Goldstein, Arthur J.; and Parsi, Edgardo J., 4,977,094, Cl. 436-157.000.

Irbit Research & Consulting AG: *See—*
Irrgeher, Fritz; and Schwarze, Frank, 4,977,018, Cl. 428-314.400.

Irie, Nobuhiko; and Agawa, Jiro, to Mitsubishi Jukogyo Kabushiki Kaisha. Apparatus for sticking a metal cord strip. 4,976,807, Cl. 156-405.100.

Irrgeher, Fritz; and Schwarze, Frank, to Irbit Research & Consulting AG. Sealing element. 4,977,018, Cl. 428-314.400.

Irving, Edward: *See—*
Hatton, Kevin B.; Irving, Edward; Walshe, Josephine M. A.; and Mallaband, Anne, 4,977,293, Cl. 558-153.000.

Irwin, Lee R.: *See—*
Lotspeich, Wayne D.; and Irwin, Lee R., 4,976,449, Cl. 280-79.400.

Isaksson, Rolf H. V.: *See—*
Flensburg, Carl G. A.; and Isaksson, Rolf H. V., 4,976,420, Cl. 270-54.000.

Isayama, Katsuhiko: *See—*
Wakabayashi, Hiroshi; Iwakiri, Hisami; Tamai, Kazuhiko; and Isayama, Katsuhiko, 4,977,228, Cl. 528-12.000.

Ischay, Duane K.: *See—*
Perdue, Thomas E., Jr.; Bransky, Jeffrey D.; Carvell, William S.; Dettloff, David E.; Ischay, Duane K.; and Oberg, Kenneth H., 4,976,373, Cl. 220-335.000.

Ise, Kiyotaka, to Toyota Jidosha Kabushiki Kaisha. Wheel acceleration slip control apparatus in a vehicle brake system. 4,976,329, Cl. 180-197.000.

Ishibutsu, Kokichi: *See—*
Kawamura, Takao; Miyamoto, Naooki; Ito, Hiroshi; Takemura, Hitoshi; and Ishibutsu, Kokichi, 4,977,050, Cl. 430-57.000.

Ishida, Kouichi; Nakamura, Mikio; and Takayama, Yukio, to Kanzaki Paper Manufacturing Co., Ltd. Heat sensitive recording material. 4,977,133, Cl. 503-226.000.

Ishida, Tatsuya: *See—*
Suzuki, Junji; Ishida, Tatsuya; Toda, Kazuya; Ikeda, Tatsufumi; Tsukidate, Yokichi; and Yasuo, Kikuchi, 4,977,171, Cl. 514-365.000.

Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, to Mitsubishi Jidosha Kogyo Kabushiki Kaisha. Method for determining combustion condition in spark ignition internal combustion engine and combustion condition control device. 4,976,241, Cl. 123-425.000.

Ishigaki, Yukinobu; and Mizuno, Kenichi, to Victor Company of Japan, Ltd. Spread spectrum communication system. 4,977,578, Cl. 375-1.000.

Ishige, Osamu; Masukawa, Toyoaki; Kida, Shuji; and Hirabayashi, Shigeto, to Konica Corporation. Silver halide light-sensitive color photographic material. 4,977,073, Cl. 430-549.000.

Ishiguro, Ginya: *See—*
Yano, Norio; and Ishiguro, Ginya, 4,977,040, Cl. 428-692.000.

Ishii, Atsujiro; and Uzawa, Tsutomu, to Olympus Optical Co., Ltd. Zoom lens system. 4,976,521, Cl. 350-423.000.

Ishii, Fumio: *See—*
Usagawa, Yasushi; and Ishii, Fumio, 4,977,063, Cl. 430-264.000.

Ishii, Itaru: *See*—
Onishi, Toshitada; Higuchi, Noboru; and Ishii, Itaru, 4,977,039, Cl. 428-623.000.

Ishii, Kazuo: *See*—
Kato, Eiichi; Ishii, Kazuo; and Hattori, Hideyuki, 4,977,055, Cl. 430-114.000.

Ishii, Kunio: *See*—
Maeda, Keikichi; Kagawa, Naohiko; Ishii, Kunio; and Iijima, Takahiro, 4,976,932, Cl. 422-240.000.

Ishii, Sumio; Fukuda, Tetsuya; and Kani, Nobumoto, to Dai Nippon Insatsu Kabushiki Kaisha. Process for manufacture of decorative intermediate films for use in laminated glass sheets. 4,976,805, Cl. 156-100.000.

Ishii, Susumu, to Yoshida Kogyo K. K. Slider pull tab for slide fastener. 4,976,015, Cl. 24-429.000.

Ishii, Susumu: *See*—
Terada, Yasuharu; Horita, Yoshiyuki; Ishii, Susumu; and Wake, Kiyoyasu, 4,976,120, Cl. 70-68.000.

Ishikawa, Eizo, to Mitsui Kinzoku Kogyo Kabushiki Kaisha. Ceramic wiring substrate blank material and process for production thereof. 4,977,012, Cl. 428-209.000.

Ishikawa Gasket Co., Ltd.: *See*—
Udagawa, Tsunekazu, 4,976,445, Cl. 277-231.000.

Ishikawa, Katsukiyo: *See*—
Ohishi, Masao; Kida, Katsuaki; Ishikawa, Katsukiyo; Saito, Takao; and Nagata, Kouichi, 4,977,053, Cl. 430-106.600.

Ishikawa, Satoru; and Toyomi, Toshitaka, to Janome Sewing Machine Company Limited. Sewing machine of a sewing machine by wireless controller. 4,976,552, Cl. 388-811.000.

Ishikawa, Shunichi; and Nakamura, Koichi, to Fuji Photo Film Co., Ltd. Image-forming method using silver halide and polymerizable compound. 4,977,057, Cl. 430-138.000.

Ishikawa, Sueyoshi: *See*—
Hisamoto, Iwao; Hirai, Masaru; and Ishikawa, Sueyoshi, 4,976,741, Cl. 8-115.600.

Ishikawa, Yoshihiro, to Fuji Photo Film Co., Ltd. Method of zooming in a camera and device for use in such method. 4,976,523, Cl. 350-429.000.

Ishikawa, Yoshikazu: *See*—
Sasajima, Koji; and Ishikawa, Yoshikazu, 4,976,169, Cl. 74-866.000.

Ishikawa, Yujiro: *See*—
Kuzuya, Susumu; Shimizu, Seiji; Kato, Mikio; Ishikawa, Yujiro; Sakai, Takashi; and Yuki, Eiji, 4,976,558, Cl. 400-615.200.

Ishikawajima-Harima Heavy Industries Co., Ltd.: *See*—
Shiozawa, Shoji; and Shimizu, Toru, 4,977,041, Cl. 429-26.000.

Ishitoya, Koichi: *See*—
Hangai, Toshimasa; Ishitoya, Koichi; and Tagawa, Akihiko, 4,977,554, Cl. 369-215.000.

Ishiwatari, Akio, to Kayaku Akzo Corporation. Unssturated alkyd-containing organic peroxide composition. 4,977,240, Cl. 528-493.000.

Ishizuka, Seiji, to Fuji Photo Film Co., Ltd. Method of simultaneous multilayer application. 4,976,999, Cl. 427-420.000.

Ishizuka, Shinichi; Suzuki, Takao; Umesato, Shoji; and Okada, Yoshikatsu, to Japan Aviation Electronics Industry Limited; and NEC Corporation. IC socket. 4,976,624, Cl. 439-70.000.

Islip, Peter J.: *See*—
Kneen, Geoffrey; Jackson, William P.; Islip, Peter J.; and Wates, Peter J., 4,977,188, Cl. 514-575.000.

Isogai, Nobuo: *See*—
Okawa, Takashi; Isogai, Nobuo; and Tsuji, Tomoji, 4,976,679, Cl. 560-159.000.

Isowa, Yoshikazu: *See*—
Hirakawa, Nobuhiko; Kashiwaba, Noriaki; Matsumoto, Hajime; Hosoda, Akihiko; Sekine, Yasuo; Isowa, Yoshikazu; Yamura, Tetsuaki; Sekine, Akihiro; and Nishikawa, Masashi, 4,977,267, Cl. 546-272.000.

Istituto Guido Donegani S.p.A.: *See*—
Gementi, Francesco; Sogli, Loris; and Ungarelli, Raffaele, 4,977,291, Cl. 556-466.000.

Isuzu Motors Limited: *See*—
Kawamura, Hideo, 4,976,228, Cl. 123-90.110.

Itabashi, Satoshi: *See*—
Shimada, Tetsuya; Itabashi, Satoshi; and Hatanaka, Katsunori, 4,977,096, Cl. 437-2.000.

Itagaki, Masanori: *See*—
Ino, Masumitsu; Kohata, Mitsuhiro; Itagaki, Masanori; Nagata, Takehito; and Tanaka, Hiroyuki, 4,977,304, Cl. 250-208.100.

Itagaki, Takaharu; Okada, Hiroyoshi; Miyake, Masao; Kobayashi, Takaaki; Tosa, Takahumi; and Satou, Hiroyuki, to Mitsubishi Kasei Corporation; and Ajinomoto Company, Incorporated. Feed additive for ruminants. 4,976,976, Cl. 426-69.000.

Itagaki, Yoko; and Hiranuma, Masahiro, to Hoya Corporation. Kit for contact lens sterilization and method for contact lens sterilization. 4,976,921, Cl. 422-28.000.

Itatsu, Toshiro: *See*—
Takahashi, Takeshi; and Itatsu, Toshiro, 4,976,245, Cl. 123-506.000.

ITC Incorporated: *See*—
Camarota, Richard J., 4,976,212, Cl. 114-178.000.

Ito, Fimihiko: *See*—
Otani, Kenzi; and Ito, Fimihiko, 4,977,356, Cl. 318-138.000.

Ito, Hiroshi; Handa, Junichi; Takagi, Yoshio; and Minohara, Taketoshi, to Toyota Jidosha Kabushiki Kaisha. Pigment. 4,976,787, Cl. 106-441.000.

Ito, Hiroshi: *See*—
Kawamura, Takao; Miyamoto, Naooki; Ito, Hiroshi; Takemura, Hitoshi; and Ishibutsu, Kokichi, 4,977,050, Cl. 430-57.000.

Ito, Jinichi: *See*—
Sawai, Kenji; Takeuchi, Tuneto; and Ito, Jinichi, 4,977,359, Cl. 318-561.000.

Itoh, Kunio; Fukuda, Takeshi; and Nakamura, Tsutomu, to Shin-Etsu Chemical Co., Ltd. Ethylene-propylene organopolysiloxane rubber composition. 4,977,200, Cl. 523-223.000.

Itoh, Masahiko: *See*—
Kobayashi, Shiro; Itoh, Masahiko; and Izumiya, Masakiyo, 4,977,443, Cl. 357-82.000.

Itou, Takeo; and Matsuda, Hidemi, to Kabushiki Kaisha Toshiba. Color filter and cathode-ray tube using the color filter. 4,977,347, Cl. 313-478.000.

Itsuki, Fumiaki: *See*—
Fushiya, Fusao; Hayashi, Akiharu; Itsuki, Fumiaki; and Nagata, Kunio, 4,977,358, Cl. 318-268.000.

Iwakiri, Hisami: *See*—
Wakabayashi, Hiroshi; Iwakiri, Hisami; Tamai, Kazuhiko; and Isayama, Katsuhiko, 4,977,228, Cl. 528-12.000.

Iwamoto, Nobuya; Umesaki, Norimasa; Hidaka, Hiroaki; and Haibara, Yukio, to Sumitomo Cement Co., Ltd. Bonding composition for ceramics comprising metal oxide melt and method for bonding ceramics. 4,976,806, Cl. 156-325.000.

Iwasaki, Hiroshi: *See*—
Fujikawa, Yoshihiro; Suzuki, Mikio; Iwasaki, Hiroshi; Sakashita, Mitsuaki; and Kitahara, Masaki, 4,977,161, Cl. 514-302.000.

Iwasaki, Hiroyuki: *See*—
Matsuhisa, Tadaaki; and Iwasaki, Hiroyuki, 4,976,903, Cl. 264-86.000.

Iwasaki, Keiichi: *See*—
Shimada, Kazuyuki; Niito, Yoshiharu; Kiya, Yikitoshi; Yagishita, Takahiro; Miyamoto, Masayoshi; Azumai, Hideo; and Iwasaki, Keiichi, 4,977,414, Cl. 346-154.000.

Iwasaki, Takao; Horikoshi, Katsumi; and Yoshiji, Yuzo, to Kureha Kagaku Kogyo Kabushiki Kaisha. Process for recovering N-methylpyrrolidone by plural distillations. 4,976,825, Cl. 203-71.000.

Iwasaki, Tetsuji, to Kao Corporation. Activator for biocide. 4,976,769, Cl. 71-86.000.

Iwashima, Osamu, to NEC Corporation. Resin-molded type photosensor. 4,977,317, Cl. 250-239.000.

Iwata, Keiichi: *See*—
Kitahara, Koichi; Shimada, Takashi; Iwata, Keiichi; and Akitya, Noboru, 4,976,942, Cl. 423-294.000.

Iwata, Shunichi: *See*—
Sakamura, Ken; Shimizu, Toru; Iwata, Shunichi; and Enomoto, Tatsuya, 4,977,497, Cl. 364-200.000.

Izaki, Takesi: *See*—
Asai, Shin; Akao, Michitoshi; Katoh, Tokunori; Sakakibara, Kenji; Izaki, Takesi; and Morisaki, Hiroshi, 4,977,437, Cl. 355-27.000.

Izumi, Shuji: *See*—
Tsuji, Kenji; Izumi, Shuji; Nakai, Masaaki; and Taniguchi, Nobuyuki, 4,977,423, Cl. 354-402.000.

Izumiya, Masakiyo: *See*—
Kobayashi, Shiro; Itoh, Masahiko; and Izumiya, Masakiyo, 4,977,443, Cl. 357-82.000.

J.L.J. Manufacturing, Inc.: *See*—
Jeffrey, Jennings L., 4,976,250, Cl. 124-25.000.

Jabbour, Kamal: *See*—
Saylor, Charles H. M.; and Jabbour, Kamal, 4,977,390, Cl. 340-521.000.

Jabs, Alfred, to MTU Motoren- Und Turbinen-Union Munchen GmbH. Support means for a heat exchanger to resist shock forces and differential thermal effects. 4,976,310, Cl. 165-82.000.

Jack, David E., to Prevent-A-Crime International, Inc. Marking system. 4,976,456, Cl. 283-70.000.

Jacks, Wendy S.: *See*—
Turner, James A.; Jacks, Wendy S.; and Zorner, Paul S., 4,976,772, Cl. 71-92.000.

Jackson, Graham: *See*—
Homer, Nigel J.; Jackson, Graham; Sankey, George H.; and Simpson, Philip J., 4,977,254, Cl. 536-124.000.

Jackson, William P.: *See*—
Kneen, Geoffrey; Jackson, William P.; Islip, Peter J.; and Wates, Peter J., 4,977,188, Cl. 514-575.000.

Jacob, Adir. Process for dry sterilization of medical devices and materials. 4,976,920, Cl. 422-23.000.

Jacobsen, Poul; Nielsen, Flemming E.; Honore, Tage; and Drejer, Jorgen, to A/S Ferrosan. 1,2,3-triazolo compounds. 4,977,155, Cl. 514-250.000.

Jacquemet, Christian: *See*—
Martineu, Pierre; Saunier, Christiane; Rousset, Jacky; and Jacquemet, Christian, 4,977,192, Cl. 521-56.000.

Jaeger: *See*—
Eisenberger, Benjamin; and Roussel, Pierre, 4,977,372, Cl. 324-166.000.

Jaensch, Manfred: *See*—
Benninghoff, Norbert; Jaensch, Manfred; Melzer, Jaroslav; Niesar, Gunter; and Schuster, Werner, 4,976,138, Cl. 73-73.000.

Jakubiak, Marvin J.: *See*—
Porter, Bryan K.; Jakubiak, Marvin J.; and Bott, Jerry A., 4,976,090, Cl. 53-448.000.

Janik, Leon P.; and Maxwell, M. Craig, to Stanadyne Automotive Corp. Fuel filter. 4,976,852, Cl. 210-86.000.

Janome Sewing Machine Company Limited: *See*—
Ishikawa, Satoru; and Toyomi, Toshitaka, 4,976,552, Cl. 388-811.000.

Jansen, Franz; and Gros, Pierre, to Sanofi. Conjugates in which a monovalent carboxylic ionophore is associated by means of a covalent bond with a macromolecule, their use as immunotoxin potentiators and the intermediate activated ionophores. 4,977,280, Cl. 549-343.000.

Japan Aviation Electronics Industry Limited: *See*—
Ishizuka, Shinichi; Suzuki, Takao; Umesato, Shoji; and Okada, Yoshikatsu, 4,976,624, Cl. 439-70.000.

Japan Pionics, Ltd.: *See*—
Kitahara, Koichi; Shimada, Takashi; Iwata, Keiichi; and Akitya, Noboru, 4,976,942, Cl. 423-294.000.

Jartoux, Pierre, to Freyssinet International (STUP). Cable anchoring devices. 4,976,078, Cl. 52-223.00L.

Jaruzelski, John J.: *See*—
Martella, David J.; and Jaruzelski, John J., 4,976,882, Cl. 252-48.200.

Jarvis, William R.: *See*—
McConnell, Bain C.; Jarvis, William R.; Demey, C. Fred, III; and Maddrey, James G., Jr., 4,976,326, Cl. 177-145.000.

Jeane, George C. Towed, powered, land grader. 4,976,052, Cl. 37-109.000.

Jeffcott, Leo B.; and McCartney, Ronald N., to University of Melbourne, The. Method and apparatus for the measurement of bone quality in vivo. 4,976,267, Cl. 128-660.010.

Jeffrey, Jennings L., to J.L.J. Manufacturing, Inc. Adjustable compound bow. 4,976,250, Cl. 124-25.000.

Jeffries, Harry. Auto ramp safety signal. 4,977,400, Cl. 340-932.200.

Jehle, Robert E., to United States of America, Navy. 360 degree infrared surveillance with panoramic display. 4,977,323, Cl. 250-332.000.

Jensen, Gary S.: *See*—
Zegel, Douglas R.; Jensen, Gary S.; Hernick, Mark R.; and Daniels, Michael J., 4,976,080, Cl. 52-239.000.

JEOL Ltd.: *See*—
Miyabayashi, Nobuyoshi; Hosono, Masami; and Abe, Atsushi, 4,977,533, Cl. 364-726.000.

Jeromin, Lutz; Peukert, Eberhard; Gutsche, Bernhard; Wollmann, Gerhard; and Schleper, Bernard, to Henkel Kommanditgesellschaft auf Aktien. Process for the continuous transesterification of fatty acid lower alkyl esters. 4,976,892, Cl. 260-410.700.

Jessen, Ross A.; and Drake, Craig D., to Ring King Visibles, Inc. Adjustable paper guide for acoustic printer enclosure. 4,976,391, Cl. 226-196.000.

JGC Corporation: *See*—
Maeda, Keikichi; Kagawa, Naohiko; Ishii, Kunio; and Iijima, Takahiro, 4,976,932, Cl. 422-240.000.

Jidosha Kiki Co., Ltd.: *See*—
Morimitu, Yasumasa; and Yamashita, Shinichi, 4,976,998, Cl. 427-284.000.
Suzuki, Haruo; and Gotoh, Hiroya, 4,976,188, Cl. 91-369.200.

Jimenez, Euler: *See*—
Rodriguez, Domingo; Quintero, Lirio; Terrer, Maria T.; Jimenez, Euler; Silva, Felix; and Salazar, Jose, 4,976,745, Cl. 44-301.000.

Johannsmeier, Karl-Heinz: *See*—
Phillips, Edward H.; and Johannsmeier, Karl-Heinz, 4,977,361, Cl. 318-640.000.

Johansson, Bert E.: *See*—
Grims, Conrad M.; Johansson, Bert E.; and Hahn, Roger A., 4,976,131, Cl. 72-347.000.

Johansson, Irene: *See*—
Skold, Rolf; and Johansson, Irene, 4,976,919, Cl. 422-7.000.

Johns, Ken: *See*—
Bargigia, Giangelo; Re, Alberto; Corbelli, Luigi; Johns, Ken; Flabbi, Luciano; and Srinivasan, Padmanabhan, 4,977,222, Cl. 525-359.300.

Johnson, Brian K. A.; and Patsiokas, Stelios J., to Motorola, Inc. Signalling and control protocol for a communication system. 4,977,589, Cl. 379-58.000.

Johnson, David R., to Chevron Research Company. Hydrodemetalation and hydrodesulfurization using a catalyst of specified macroporosity. 4,976,848, Cl. 208-251.00H.

Johnson Electric S.A.: *See*—
Wang, Patrick S., 4,977,343, Cl. 310-42.000.

Johnson, Eric T.: *See*—
Doty, Gerald A.; and Johnson, Eric T., 4,976,474, Cl. 242-107.700.

Johnson & Johnson Orthopaedics, Inc.: *See*—
Broadnax, Cecil H., Jr., 4,976,684, Cl. 604-51.000.

Johnson, Mark S.; Beaver, Edward; Jovanovic, Manojlo; and Chavez, Domingo, to Oil-Dri Corporation of America. Pelleting agent having energy value. 4,976,977, Cl. 426-96.000.

Johnson, Richard D.: *See*—
Callahan, Robert W.; and Johnson, Richard D., 4,976,897, Cl. 264-22.000.

Johnson, Richard T.: *See*—
Abujudom, David N., II; Dougherty, Thomas J.; Inkmann, Mark S.; Johnson, Richard T.; Karolek, Neil C.; and Saari, David W., 4,976,327, Cl. 180-68.200.

Johnson, Stephen J.; and Moos, Walter H., to Warner-Lambert Company. Method of treating the symptoms of cognitive decline in an elderly patient employing (S)-3-ethyl-4-[(1-methyl-1H-imidazol-5-yl)-methyl]-2-oxazolidinone. 4,977,172, Cl. 514-374.000.

Johnson, Steven P.: *See*—
Barder, Timothy J.; Bedwell, W. Brian; and Johnson, Steven P., 4,977,243, Cl. 530-208.000.

Johnston, J. Ford; Farone, William A.; and Mikhail, Amir, to DWR Wind Technologies Inc. Composite wind turbine rotor blade and method for making same. 4,976,587, Cl. 416-230.000.

Johnston, Joseph G., to Bicron Corporation. Range selector switch for ion chamber instrument. 4,977,367, Cl. 324-115.000.

Jois, Yajnanarayana H. R.: *See*—
Gibson, Harry W.; and Jois, Yajnanarayana H. R., 4,977,271, Cl. 548-328.000.

Jolidon, Synese; Locher, Rita; Kompis, Ivan; Weiss, Ekkehard; and Wyss, Pierre-Charles, to Hoffmann-La Roche Inc. Quinoline derivatives. 4,977,265, Cl. 544-363.000.

Jonckheere, Gilbert R. Tribune vehicle. 4,976,485, Cl. 296-26.000.

Jones, C. Michael, to Board of Regents, The University of Texas System. Methods and compositions for inducing monocyte cytotoxicity. 4,977,245, Cl. 530-35.000.

Jones, Daniel K. Snowplow leveling system. 4,976,054, Cl. 37-235.000.

Jones, James, to British Nuclear Fuels plc. Flask assembly for contaminated objects. 4,976,579, Cl. 414-146.000.

Jones, John F., to Williams International Corporation. Dual output planetary gear system. 4,976,669, Cl. 475-248.000.

Jones, Louis F.: *See*—
Teel, Willis A.; and Jones, Louis F., 4,977,545, Cl. 367-124.000.

Jongewaard, Susan K.; Smith, Terrance P.; Leichter, Louis M.; and Zaklika, Krzysztof A., to Minnesota Mining and Manufacturing Company. Thermal transfer imaging using sulfonylaminoanthraquinone dyes. 4,977,134, Cl. 503-227.000.

Jordan, Debbee J.: *See*—
Holloman, Miles E.; Jordan, Debbee J.; and Otto, William F., 4,976,789, Cl. 136-246.000.

Jorgensen, Eskil B.: *See*—
Skovhage, Erik; Jorgensen, Eskil B.; Nielsen, Per G.; and Sorensen, Christian B., 4,976,981, Cl. 426-512.000.

Jost, Gerhard; and Werner, Hans, to Carl Schenck AG. Method and system for controlling a differential dosing scale. 4,977,526, Cl. 364-567.000.

Jothimurugesan, Kandaswami: *See*—
Flytzani-Stephanopoulos, Maria; and Jothimurugesan, Kandaswami, 4,977,123, Cl. 502-84.000.

Jovanovic, Manojlo: *See*—
Johnson, Mark S.; Beaver, Edward; Jovanovic, Manojlo; and Chavez, Domingo, 4,976,977, Cl. 426-96.000.

Juds, Scott; Halsey, Johnny H.; and Halsey, James H., to IDX, Inc. Coin counter security circuit. 4,976,346, Cl. 194-200.000.

Juen, Masahiro, to Nikon Corporation. Photometric apparatus employing solid-state imaging device. 4,977,312, Cl. 250-208.100.

Julien, Philippe. Equipment and methods for injecting aqueous nutrient solution in hydroponic culture. 4,976,064, Cl. 47-63.000.

Julius, David: *See*—
Sprague, George; Herskowitz, Ira; Thorner, Jeremy; Julius, David; Blair, Lindley; and Brake, Anthony, 4,977,085, Cl. 435-212.000.

Jung, Jong-in, to Samsung Electron Devices Co., Ltd. Manufacturing method for dispenser cathode for an electron gun. 4,976,644, Cl. 445-50.000.

Jungblut, Peter; Wiechert, Rudolf; and Bittler, Dieter, to Schering Aktiengesellschaft. 17-methylene- and 17-ethylidene-estratrienes. 4,977,147, Cl. 514-171.000.

Jusupov, Izil G.: *See*—
Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A., 4,976,322, Cl. 175-57.000.

K.J. Manufacturing: *See*—
Bedi, Ram D.; and van der Griendt, Andrianus J., 4,976,233, Cl. 123-196.00R.

Kabashima, Akira: *See*—
Suzuki, Hirohisa; Kabashima, Akira; Yamagishi, Mikio; and Ogawa, Ryuichi, 4,977,615, Cl. 455-277.000.

Kabushiki Kaisha Kenwood: *See*—
Hashimoto, Kiroyuki; Iizuka, Nobuo; and Suzuki Akira, 4,977,608, Cl. 425-62.000.

Kabushiki Kaisha Kobe Seiko Sho: *See*—
Nagahama, Yasuhide, 4,976,165, Cl. 74-400.000.

Kabushiki Kaisha Sakura Kurepasu: *See*—
Fukuoka, Mitsuhiro; Kobayashi, Nobuaki; and Tamiya, Fumiyuki, 4,976,564, Cl. 401-206.000.

Kabushiki Kaisha Sankyo Seiki Seisakusho: *See*—
Aruga, Mutsumi; and Nakamichi, Niro, 4,977,468, Cl. 360-75.000.
Sawai, Kenji; Takeuchi, Tuneto; and Ito, Jinichi, 4,977,359, Cl. 318-561.000.

Kabushiki Kaisha Toshiba: *See*—
Asakura, Masahiko; Shiraiwa, Kimio; Hattori, Yoichi; and Toume, Naotosi, 4,977,349, Cl. 313-490.000.
Bunpei, Irie; and Asada, Haruo, 4,977,603, Cl. 382-34.000.
Honda, Michitaka, 4,977,587, Cl. 378-99.000.
Ibe, Hiroyuki; and Yamakawa, Hideaki, 4,977,561, Cl. 372-23.000.
Itou, Takeo; and Matsuda, Hidemi, 4,977,347, Cl. 313-478.000.
Kanda, Yasuyuki, 4,977,409, Cl. 346-23.000.
Kawai, Kiyoyuki, 4,977,445, Cl. 358-17.000.
Kondo, Yuji, 4,977,467, Cl. 360-74.100.
Masuda, Satoshi; Shigemitsu, Fumiaki; and Usuda, Kinya, 4,976,810, Cl. 156-659.100.
Ogawa, Atsusi, 4,977,335, Cl. 307-272.200.
Suzumori, Koichi; Matsumaru, Takafumi; and Iikura, Shoichi, 4,976,191, Cl. 92-48.000.
Takatoh, Kohki; Sakamoto, Masanori; and Sunohara, Kazuyuki, 4,976,887, Cl. 252-299.620.
Takenaka, Shigeo; Kamohara, Eiji; and Nishimura, Takashi, 4,977,447, Cl. 358-66.000.

Kabushiki Kaisha Yamamoto Kinzoku Seisakusho: *See*—
Yamamoto, Takashi; and Yamamoto, Hiroshi, 4,976,126, Cl. 72-83.000.

Kadomukai, Yuzo: *See*—
Tanaka, Naoyuki; Nakamura, Yozo; Arai, Akira; Nakamura, Mitsuru; Endo, Tsunehiro; and Kadomukai, Yuzo, 4,977,508, Cl. 364-431.080.

Kadouchi, Eiji; Matsumoto, Isao; Fujii, Takabumi; Sato, Hiroshi; and Hino, Takashi, to Matsushita Electric Industrial Co., Ltd. Rectangular sealed alkaline storage battery with negative electrode comprising hydrogen storage alloy. 4,977,043, Cl. 429-54.000.

Kadoya, Teruichi, to Toyo Roki Seizo Kabushiki Kaisha. Multi-layer filter medium. 4,976,858, Cl. 210-496.000.

Kagan, Jonathan: *See*—
Solar, Ronald J.; and Kagan, Jonathan, 4,976,690, Cl. 604-96.000.

Kagawa, Naohiko: *See*—
Maeda, Keikichi; Kagawa, Naohiko; Ishii, Kunio; and Iijima, Takahiro, 4,976,932, Cl. 422-240.000.

Kageyama, Shuhei, to Kotobuki & Co., Ltd. Writing tools. 4,976,561, Cl. 401-75.000.

Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, to Kyoto University of Honmachi; Taisho Pharmaceutical Co., Ltd.; and Daikin Industries, Ltd. Fluorine-containing 2-nitroimidazole derivatives. 4,977,273, Cl. 548-339.000.

Kahaney, Alan. Eyeglasses retainer strap. 4,976,531, Cl. 351-156.000.

Kaiser, Charlie J.: *See*—
Carlson, Nils W.; Evans, Gary A.; and Kaiser, Charlie J., 4,976,539, Cl. 356-5.000.

Kajima Corporation: *See*—
Shimamura, Eiji, 4,976,422, Cl. 272-56.555.

Kakimoto, Norihiro; Nakamura, Kunie; and Yoshihara, Toru, to Asai Germanium Research Institute Co. Organogermanium compounds and process for producing the same. 4,977,287, Cl. 556-83.000.

Kali-Chemie Pharma GmbH: *See*—
Block, Juergen; Feicho, Lutz; Sobe, Alwin; and Wischniewski, Martin, 4,976,965, Cl. 424-456.000.

Kalkhof, Bernd: *See*—
Schmied, Helmut; and Kalkhof, Bernd, 4,976,247, Cl. 123-651.000.

Kallrot, Magnus: *See*—
Dahlgren, Arthur; Kallrot, Magnus; and Stromblad, Mats, 4,976,313, Cl. 165-167.000.

Kalyanaraman, Palaiyur S., to Hoechst Celanese Corp. Novel siloxy substituted naphthalocyanines and method of preparation. 4,977,068, Cl. 430-495.000.

Kamata, Susumu: *See*—
Narisada, Masayuki; Ohtani, Mitsuaki; Watanabe, Fumihiko; Hagishita, Sanji; Seno, Kaoru; and Kamata, Susumu, 4,976,891, Cl. 260-401.000.

Kamen, Dean L. Enhanced pressure measurement flow control system. 4,976,162, Cl. 73-865.900.

Kamenov, Kamen G. Human powered vehicle. 4,976,451, Cl. 280-226.100.

Kami, Shigetake: *See*—
Nishi, Naomi; Kami, Shigetake; and Yamaguchi, Takashi, 4,976,918, Cl. 420-546.000.

Kaminnik, Alexandr A.: *See*—
Gershuni, Alexandr N.; Maisotsenko, Valery S.; Kaminnik, Alexandr A.; Zaripov, Vladilen K.; Nischik, Alexandr P.; and Levterov, Alexandr I., 4,976,113, Cl. 62-314.000.

Kamio, Takashi: *See*—
Iijima, Toshifumi; Yamada, Yoshitaka; Kumashiro, Kenji; Akamatsu, Hideo; and Kamio, Takashi, 4,977,069, Cl. 430-506.000.

Kamiyama, Osamu: *See*—
Tani, Toshio; Kamiyama, Osamu; Matsuki, Noborn; Fukuda, Ryosaku; Akutsu, Tsukasa; and Nakatsugawa, Hiroshi, 4,976,826, Cl. 204-12.000.

Kamohara, Eiji: *See*—
Takenaka, Shigeo; Kamohara, Eiji; and Nishimura, Takashi, 4,977,447, Cl. 358-66.000.

Kamutzki, Walter; and Keil, Karl-Heinz, to Cassella Aktiengesellschaft. Polybase from amino amido carboxylic acid, polyamine and difunctional alkylating agent. 4,977,239, Cl. 528-310.000.

Kamyr AB: *See*—
Richter, Johan C. F. C.; and Richter, Ole J., 4,976,586, Cl. 415-143.000.

Kanai, Hiroshi: *See*—
Sonoda, Yukihiro; Osawa, Kouichi; Kanai, Hiroshi; Hoshi, Kouichi; Matsuoka, Hiroki; Ohashi, Michihiro; and Sawada, Hiroshi, 4,976,242, Cl. 123-489.000.

Kanamaru, Shinichi; Yoshimura, Shushichi; Hisashi, Hideyuki; and Sakaue, Akinori, to Mitsubishi Kasei Corporation. Process for producing carbon black. 4,976,945, Cl. 423-450.000.

Kanamori, Katsuhiro: *See*—
Murata, Kazuyuki; Kanno, Kinya; and Kanamori, Katsuhiro, 4,977,448, Cl. 358-75.000.

Kanaya, Koichi, to Ricoh Company, Ltd. Paper feed control device for copier which determines the actual number of sheets remaining. 4,976,421, Cl. 271-258.000.

Kanda, Yasuyuki, to Kabushiki Kaisha Toshiba. Recorder with automatic scale recording device. 4,977,409, Cl. 346-23.000.

Kane Graphical Corporation: *See*—
Kane, Michael, 4,976,055, Cl. 40-152.100.

Kane, Michael, to Kane Graphical Corporation. Wall mounted frame for posters and other printed material. 4,976,055, Cl. 40-152.100.

Kanegafuchi Chemical Industry Co., Ltd.: *See*—
Wakabayashi, Hiroshi; Iwakiri, Hisami; Tamai, Kazuhiko; and Isayama, Katsuhiko, 4,977,228, Cl. 528-12.000.

Kanegafuchi Kagaku Kogyo Kabushiki Kaisha: *See*—
Hisanaga, Akinori; Sakubata, Takashi; and Yoshioka, Tetsuo, 4,976,547, Cl. 366-169.000.

Kanetake, Satoshi; Hashimoto, Shinichi; Ono, Shigetoshi; and Naoi, Takashi, to Fuji Photo Film Co., Ltd. Silver halide photographic material containing an interlayer containing a copolymer core-shell latex. 4,977,071, Cl. 430-534.000.

Kang, Sangwon: *See*—
Yu, Hyunkyu; Kang, Sangwon; and Lee, Jinhyo, 4,977,098, Cl. 437-31.000.

Kangas, Martti Y. O. Apparatus for cleaning fibers. 4,976,822, Cl. 162-380.000.

Kani, Nobumoto: *See*—
Ishii, Sumio; Fukuda, Tetsuya; and Kani, Nobumoto, 4,976,805, Cl. 156-100.000.

Kanno, Kinya: *See*—
Murata, Kazuyuki; Kanno, Kinya; and Kanamori, Katsuhiro, 4,977,448, Cl. 358-75.000.

Kanno, Takao; Koda, Yutaka; and Nagato, Hirokazu, to Nok Corporation. Process for preparing a magnetic fluid. 4,976,883, Cl. 252-62.520.

Kano, Tokio: *See*—
Niimura, Toshinobu; Takahashi, Tadashi; Kashiba, Mutsuro; Sakai, Ko; and Kano, Tokio, 4,977,078, Cl. 435-7.000.

Kansai Paint Co., Ltd.: *See*—
Kitabatake, Michiharu, 4,977,203, Cl. 523-420.000.

Kansas Power and Light Company, The: *See*—
Potvin, Michael J., 4,976,134, Cl. 73-3.000.

Kanzaki Paper Manufacturing Co., Ltd.: *See*—
Ishida, Kouichi; Nakamura, Mikio; and Takayama, Yukio, 4,977,133, Cl. 503-226.000.
Tsuchida, Tetsuo; Meguro, Tatsuya; Seyama, Fumio; and Kondo, Mitsuru, 4,977,132, Cl. 503-220.000.

Kao Corporation: *See*—
Honjo, Toshio; Sato, Yuji; Fukushima, Yoshihiro; Nawa, Masayoshi; and Yasuda, Shinichiro, 4,977,054, Cl. 430-108.000.
Iwasaki, Tetsuji, 4,976,769, Cl. 71-86.000.
Nebashi, Tsutomu; Iguchi, Kazuo; and Murata, Moriyasu, 4,977,204, Cl. 524-186.000.
Takahashi, Hiromichi; and Tsujii, Kaoru, 4,976,860, Cl. 210-500.280.
Yasukawa, Takuji; Yasumura, Daisuke; Yamasawa, Kimiko; Tanaka, Yukitaka; and Nishide, Tsutomu, 4,976,984, Cl. 426-602.000.

Kaplan, James H., to Harlan Corporation. Towing hitch with shiftable hitch member. 4,976,453, Cl. 280-479.200.

Kaplan, Martin C., to Eastman Kodak Company. Film noise reduction by application of bayes theorem to positive/negative film. 4,977,521, Cl. 364-525.000.

Kappelhof, Heinrich; and Wolf, Gottfried, to AXA-Entwicklungs- und Maschinenbau- gesellschaft fur produktionstechnische anlagen und Gerate mbH. Tool holding system for automatic tool changing. 4,976,575, Cl. 409-233.000.

Karabin, Tadeusz: *See*—
Beal, Thomas J.; Karabin, Tadeusz; and Mundy, Roy E., 4,976,253, Cl. 126-512.000.

Karaki, Koichi; Sakai, Mitsugu; and Sasaki, Yasuo, to Olympus Optical Co., Ltd. Ultrasonic microscope. 4,977,544, Cl. 367-7.000.

Karasaki, Toshihiko: *See*—
Mukai, Hiromu; Karasaki, Toshihiko; and Hayashi, Kohtaro, 4,977,424, Cl. 354-410.000.

Karban, George: *See*—
Lotznicker, Lucio; Hawkins, Raymond R.; Karban, George; Leivenzon, Simon; and Leivenzon, Zvi, 4,976,168, Cl. 74-625.000.

Karl Lautenschlager GmbH & Co. KG.: *See*—
Lautenschlager, Karl, 4,976,006, Cl. 16-238.000.

Karolek, Neil C.: *See*—
Abujudom, David N., II; Dougherty, Thomas J.; Inkmann, Mark S.; Johnson, Richard T.; Karolek, Neil C.; and Saari, David W., 4,976,327, Cl. 180-68.200.

Karube, Norio, to Fanuc Ltd. Laser oscillator. 4,977,574, Cl. 372-93.000.

Kasahara, Kaoru: *See*—
Motegi, Takeo; Sakuraba, Yasuya; Iguchi, Hiroyuki; and Kasahara, Kaoru, 4,976,768, Cl. 71-76.000.

Kasai, Kenichi: *See*—
Nakajima, Tadakatsu; Kuwahara, Heikichi; Ohashi, Shigeo; Satoh, Motohiro; Yamada, Toshihiro; Kasai, Kenichi; Kobayashi, Satomi; and Watanabe, Akihide, 4,977,444, Cl. 357-82.000.

Kasemset, Dumrong: *See*—
Oliver, James D., Jr.; Biles, Kenneth A.; and Kasemset, Dumrong, 4,977,371, Cl. 324-158.00T.

Kashiba, Mutsuro: *See*—
Niimura, Toshinobu; Takahashi, Tadashi; Kashiba, Mutsuro; Sakai, Ko; and Kano, Tokio, 4,977,078, Cl. 435-7.000.

Kashihara, Kouji: *See*—
Okura, Toshihiko; Hirao, Kouji; Watanabe, Tetsuaki; and Kashihara, Kouji, 4,976,508, Cl. 350-96.230.

Kashiwaba, Noriaki: *See*—
Hirakawa, Nobuhiko; Kashiwaba, Noriaki; Matsumoto, Hajime; Hosoda, Akihiko; Sekine, Yasuo; Isowa, Yoshikazu; Yamura, Tetsuaki; Sekine, Akihiro; and Nishikawa, Masashi, 4,977,267, Cl. 546-272.000.

Kashiwaya, [illegible]o: *See*—
Sano, Y[illegible]nori; Kashiwaya, Mineo; and Ikeda, Yuuji, 4,976,243, Cl. 123-49[illegible].00.
Kassis, Amin I.; and Khawli, Leslie A., to President and Fellows of Harvard College. M-aminophenyltrialkylstannane. 4,977,288, Cl. 556-87.000.
Kast, Hellmut: *See*—
Dix, Johannes P.; Hansen, Guenter; and Kast, Hellmut, 4,976,744, Cl. 8-527.000.
Katayama, Kazuyoshi: *See*—
Murai, Nobuyoshi; Takahashi, Yoshinori; and Katayama, Kazuyoshi, 4,976,415, Cl. 267-136.000.
Kato, Akira: *See*—
Ichikawa, Yasunori; Yamaguchi, Shigeru; Ohnishi, Hiroshi; Kojima, Akira; and Kato, Akira, 4,976,404, Cl. 251-121.000.
Kato, Eiichi, to Fuji Photo Film Co., Ltd. Electrophotographic lithographic printing plate precursor. 4,977,049, Cl. 430-49.000.
Kato, Eiichi; Ishii, Kazuo; and Hattori, Hideyuki, to Fuji Photo Film Co., Ltd. Liquid developer for electrostatic photography. 4,977,055, Cl. 430-114.000.
Kato, Mikio: *See*—
Kuzuya, Susumu; Shimizu, Seiji; Kato, Mikio; Ishikawa, Yujiro; Sakai, Takashi; and Yuki, Eiji, 4,976,558, Cl. 400-615.200.
Kato, Yasuyoshi; Teshima, Nobue; Ohta, Masao; and Konishi, Kunihiko, to Babcock-Hitachi Kabushiki Kaisha. Catalyst for combustion and process for producing same. 4,977,128, Cl. 502-328.000.
Katoh, Kazunobu: *See*—
Yagihara, Morio; Okada, Hisashi; Katoh, Kazunobu; and Inoue, Nobuaki, 4,977,062, Cl. 430-264.000.
Katoh, Tokunori: *See*—
Asai, Shin; Akao, Michitoshi; Katoh, Tokunori; Sakakibara, Kenji; Izaki, Takesi; and Morisaki, Hiroshi, 4,977,437, Cl. 355-27.000.
Katori, Tatsuhiko: *See*—
Hasegawa, Hiroshi; Mogi, Kinichi; Shioiri, Noriaki; Sato, Susumu; and Katori, Tatsuhiko, 4,977,275, Cl. 548-539.000.
Katta, Viswanatham: *See*—
Chowdhury, Swapan K.; Katta, Viswanatham; and Chait, Brian T., 4,977,320, Cl. 250-288.000.
Kaufhold, Horst T., to AMSTED Industries Incorporated. Pulling lug for railway vehicle coupler. 4,976,362, Cl. 213-152.000.
Kaveckis, Joseph E.; and Pertchik, S. Roy. Roof hinge arrangement and method of using same for modular housing. 4,976,075, Cl. 52-71.000.
Kawada, Kazuo; and Oiwa, Yuichi, to Stack Electronics Co., Ltd. Supporting device for a trimmer condenser in a connector of a probe. 4,977,481, Cl. 361-287.000.
Kawaguchi, Naoko: *See*—
Fukami, Harukazu; Higuchi, Naoki; Kawaguchi, Naoko; Hashimoto, Masaki; Ide, Kinya; and Takahashi, Toshio, 4,976,773, Cl. 71-94.000.
Kawaguchi, Shogo: *See*—
Kozuka, Yoshinari; and Kawaguchi, Shogo, 4,976,517, Cl. 350-355.000.
Kawai, Kiyoyuki, to Kabushiki Kaisha Toshiba. Sync-signal reproducing circuit for use in television receiver. 4,977,445, Cl. 358-17.000.
Kawakita, Kenji: *See*—
Hashimoto, Kazuhiko; Koizumi, Taichi; Kawakita, Kenji; and Nomura, Noboru, 4,976,818, Cl. 156-643.000.
Kawamura, Hideo, to Isuzu Motors Limited. Valve control system for internal combustion engine. 4,976,228, Cl. 123-90.110.
Kawamura, Makoto: *See*—
Fujimori, Shinichiro; Yamazaki, Satoshi; Sugano, Mamoru; Kawamura, Makoto; Ninomiya, Kunihiro; Tobe, Akihiro; and Nitta, Issei, 4,977,151, Cl. 514-225.500.
Kawamura, Takao; Miyamoto, Naooki; Ito, Hiroshi; Takemura, Hitoshi; and Ishibutsu, Kokichi, to Kyocera Corporation. Electrophotographic sensitive member. 4,977,050, Cl. 430-57.000.
Kawasaki Steel Corporation: *See*—
Ichikawa, Fumihiko; and Ohki, Toshio, 4,976,149, Cl. 73-597.000.
Tsunoda, Takeo; Takeo, Setsu; Nobusawa, Tatsuya; Enomoto, Norihide; Takahashi, Hiroyasu; Watanabe, Minoru; Sasaki, Yutaka; and Tanaka, Kunihiro, 4,976,941, Cl. 423-247.000.
Kayaku Akzo Corporation: *See*—
Ishiwatari, Akio, 4,977,240, Cl. 528-493.000.
Kayane, Yutaka; Omura, Takashi; Harada, Naoki; Mori, Yasuji; Yamamoto, Yosuke; Miyamoto, Tetsuya; and Kusumoto, Takehiro, to Sumitomo Chemical Company, Ltd. Anthraquinone compound. 4,977,261, Cl. 544-199.000.
Kazda, Stanislav: *See*—
Schlossmann, Klas; Zembrod, Alfred; Kazda, Stanislav; Serno, Peter; and Klinksiek, Bernd, 4,976,964, Cl. 424-450.000.
Kazecki, Henry L.: *See*—
Linder, Donald L.; Goode, Steve H.; Kazecki, Henry L.; Dennis, Donald W.; and Baker, James C., 4,977,616, Cl. 455-277.000.
Keating, Kenneth P.: *See*—
Marquis, Edward T.; Keating, Kenneth P.; Meyer, Robert A.; and Sanderson, John R., 4,977,285, Cl. 549-529.000.
Keil, Karl-Heinz: *See*—
Kamutzki, Walter; and Keil, Karl-Heinz, 4,977,239, Cl. 528-310.000.
Kelley, James O.; Williams, George A.; Kurrasch, Andrew J.; and Hollington, Geoffrey A., to Herman Miller, Inc. Cabinet with pocketing doors. 4,976,502, Cl. 312-322.000.
Kelly, John A.: *See*—
Hwa, Chih M.; Kelly, John A.; and Adhya, Mita, 4,977,292, Cl. 558-81.000.
Kelsey, Charles A.: *See*—
Huffman, Dennis D.; Hughes, Robert C.; Kelsey, Charles A.; Lane, Richard; Ricco, Antonio J.; Snelling, Jay B.; and Zipperian, Thomas E., 4,976,266, Cl. 128-659.000.
Kelsey-Hayes Company: *See*—
Sivulka, Gerald M.; and Every, Peter, 4,976,501, Cl. 303-113.000.
Kelterborn, Heinz; and Schiebelhuth, Heinz, to Braun Aktiengesellschaft. Bread toaster. 4,976,194, Cl. 99-328.000.
Kemp, Ian, to Sumitomo Rubber Industries, Limited. Wheel rim for a pneumatic tire. 4,976,498, Cl. 301-95.000.
Kendall Company, The: *See*—
Diman, Charles; Marcus, David; Mitchell, Philip; and Sachs, Baruch, 4,976,876, Cl. 210-791.000.
Kennedy, Thomas W. Hot dog cutter apparatus and method. 4,976,029, Cl. 30-114.000.
Keramchemie GmbH: *See*—
Schippert, Egbert, 4,976,751, Cl. 55-84.000.
Kerth, Juergen; Werner, Rainer A.; Zolk, Ralf; Ruempler, Klaus-Dieter; Schweier, Guenther; Mueller-Mall, Rudolf; and Gruber, Wolfgang, to BASF Aktiengesellschaft. Preparation of propylene-/ethylene polymers of the toughened polypropylene type. 4,977,210, Cl. 525-53.000.
Kesseler, Kurt: *See*—
Wess, Gunther; Kesseler, Kurt; Baader, Ekkehard; and Beck, Gerhard, 4,977,279, Cl. 549-274.000.
Keys, James F., to Standard Products Company, The. Repositioning device for a weather seal. 4,976,068, Cl. 49-482.000.
Khan, M. Rashid, to United States of America, Energy. Apparatus and method for direct measurement of coal ash sintering and fusion properties at elevated temperatures and pressures. 4,976,549, Cl. 374-56.000.
Khawli, Leslie A.: *See*—
Kassis, Amin I.; and Khawli, Leslie A., 4,977,288, Cl. 556-87.000.
Kida, Katsuaki: *See*—
Ohishi, Masao; Kida, Katsuaki; Ishikawa, Katsukiyo; Saito, Takao; and Nagata, Kouichi, 4,977,053, Cl. 430-106.600.
Kida, Shuji: *See*—
Ishige, Osamu; Masukawa, Toyoaki; Kida, Shuji; and Hirabayashi, Shigeto, 4,977,073, Cl. 430-549.000.
Kiefer, Hans: *See*—
Meyer, Joachim; Buehler, Wolfgang; Grimmer, Johannes; Eipper, Gunter; Kiefer, Hans; and Martin, Christoph, 4,977,190, Cl. 514-951.000.
Kielmeyer, Ronald F., to Motorola, Inc. Differential pair, push-push oscillator. 4,977,379, Cl. 331-56.000.
Kienzle, Wolfgang; Sauer, Rudolf; and Woehr, Otto, to Robert Bosch GmbH. Flow rate meter. 4,976,145, Cl. 73-204.220.
Kim, Samuel. Single piece molded housing and spider for electronic dartboard. 4,976,441, Cl. 273-376.000.
Kim, Seong: *See*—
Chang, Hershow; Kim, Seong; and Motoyama, Tetsuro, 4,977,519, Cl. 364-519.000.
Kimberly-Clark Corporation: *See*—
Nohr, Ronald S.; and MacDonald, J. Gavin, 4,976,788, Cl. 134-5.000.
Kimura, Haruo: *See*—
Nakasone, Takayoshi; Kozuka, Kenji; and Kimura, Haruo, 4,976,906, Cl. 264-139.000.
Kimura, Tomoaki, to Hitachi, Ltd. Method of and apparatus for rolling directly coupled with continuous casting. 4,976,024, Cl. 29-527.600.
King, Ian R., to Dow Chemical Company, The. Separation of potassium salts. 4,976,946, Cl. 423-490.000.
King, Joseph A.: *See*—
King, Lloyd H., Sr.; and King, Joseph A., 4,976,279, Cl. 137-107.000.
King, Lloyd H., Sr.; and King, Joseph A. Self-draining backflow prevention valve. 4,976,279, Cl. 137-107.000.
Kinkade, Charles E.: *See*—
Sharp, Harold L.; and Kinkade, Charles E., 4,976,171, Cl. 74-878.000.
Kinnersley, Alan M.; and Henderson, Wayne E., to CPC International Inc. Plant food and method for its use. 4,976,767, Cl. 71-26.000.
Kinoshita, Yasushi: *See*—
Okamoto, Tatsuo; Kotani, Hideo; Oono, Takio; Watabe, Kiyoto; Kinoshita, Yasushi; and Nishikawa, Yoshikazu, 4,977,105, Cl. 437-190.000.
Kipphan, Helmut; and Haase, Josef, to Heidelberger Druckmaschinen AG. Sensor device and method of operation. 4,976,545, Cl. 356-446.000.
Kirchberg, Maurice A., Jr.; and Cook, Alexander, to Sundstrand Corporation. Suppression of switching harmonics. 4,977,492, Cl. 363-41.000.
Kirchner, Marcel: *See*—
Graner, Juergen; Kirchner, Marcel; and Kubach, Hans, 4,976,405, Cl. 251-129.160.
Kishida, Shunji; Yokoyama, Hiroyuki; Morishige, Yukio; and Washio, Kunihiko, to NEC Corporation. Method and apparatus for inducing photochemical reaction. 4,976,930, Cl. 422-186.300.
Kitabatake, Michiharu, to Kansai Paint Co., Ltd. Coating resin composition. 4,977,203, Cl. 523-420.000.
Kitada, Yoshimitsu: *See*—
Hiratsuka, Yutaka; Ohmi, Tadahiro; Murota, Junichi; Fujisaki, Yoshio; Noda, Masato; Kitada, Yoshimitsu; and Sahara, Terutaka, 4,976,815, Cl. 156-345.000.

Kitahara, Koichi; Shimada, Takashi; Iwata, Keiichi; and Akitya, Noboru, to Japan Pionics, Ltd. Method for purifying gaseous hydrides. 4,976,942, Cl. 423-294.000.

Kitahara, Masaki: *See—*
Fujikawa, Yoshihiro; Suzuki, Mikio; Iwasaki, Hiroshi; Sakashita, Mitsuaki; and Kitahara, Masaki, 4,977,161, Cl. 514-302.000.

Kitajima, Motohiro: *See—*
Tsuchiya, Kazuhisa; Enosawa, Yoshio; and Kitajima, Motohiro, 4,977,436, Cl. 357-236.000.

Kitajima, Yasuhiko: *See—*
Mizuno, Touru; and Kitajima, Yasuhiko, 4,976,356, Cl. 209-539.000.

Kitamura, Hajime; Takeuchi, Masaru; and Yoshikoshi, Hideo, to Shin-Etsu Chemical Co., Ltd. Method for detecting colored foreign particles in light-colored powder and system therefor. 4,976,540, Cl. 356-38.000.

Kitamura, Hiroki: *See—*
Takanashi, Itsuo; Ichitou, Toshikatsu; Kitamura, Hiroki; Yamamura, Takashi; Sakagami, Koubun; and Nakano, Atsushi, 4,977,417, Cl. 346-160.000.

Kitamura, Koichiro, to Kitamura Machinery Co. Ltd. Machining center. 4,976,019, Cl. 29-26.00A.

Kitamura Machinery Co. Ltd.: *See—*
Kitamura, Koichiro, 4,976,019, Cl. 29-26.00A.

Kitatani, Katsuji: *See—*
Ohno, Shigeru; Kitatani, Katsuji; Makino, Naonori; Hoshi, Satoshi; and Sato, Hideo, 4,977,051, Cl. 430-58.000.

Kitchens, Richard A. Counterboring device for wells. 4,976,323, Cl. 175-267.000.

Kittler, Wilfred C.: *See—*
Ritchie, Ian T.; and Kittler, Wilfred C., 4,977,013, Cl. 428-212.000.

Kiya, Yikitoshi: *See—*
Shimada, Kazuyuki; Niito, Yoshiharu; Kiya, Yikitoshi; Yagishita, Takahiro; Miyamoto, Masayoshi; Azumai, Hideo; and Iwasaki, Keiichi, 4,977,414, Cl. 346-154.000.

Klann, Horst. Pressure spring tensioner. 4,976,416, Cl. 267-177.000.

Klar, Erhard: *See—*
Berry, David F.; Klar, Erhard; and Svilar, Mark, 4,976,778, Cl. 75-254.000.

Klauminzer, Gary K.: *See—*
Bittenson, Steven N.; and Klauminzer, Gary K., 4,977,573, Cl. 372-81.000.

Klaus-Ulfert, Rieger, to Renfert GmbH & Co. Method and apparatus for moving a granulate material in a dental practice situation. 4,976,073, Cl. 51-410.000.

Kleber, Carl J.; and Putt, Mark S., to Purdue Research Foundation. Anticariogenic compositions. 4,976,954, Cl. 424-52.000.

Klein, Gerald B. Concentric convenience opening beverage can end. 4,976,368, Cl. 220-268.000.

Klein, Walter; and Wolf, Irmelin, to Martin & Pagenstecher GmbH. Thixotropic refractory material and a process and apparatus for lining metallurgical vessels with this material by a vibration method. 4,977,115, Cl. 501-107.000.

Kleiner, Charles T. Radiation hardened magnetic voltage and/or current reference produced by a saturable, two core transformer with first harmonic nulling. 4,977,374, Cl. 324-254.000.

Kleiner, Hans-Jerg: *See—*
Gersdorf, Joachim; and Kleiner, Hans-Jerg, 4,977,066, Cl. 430-277.000.

Kleiner, Jeffrey B. Anchored femoral dome. 4,976,740, Cl. 623-23.000.

Kleinschmit, Peter: *See—*
Pauli, Ingo; Kleinschmit, Peter; and Schwarz, Rudolf, 4,976,943, Cl. 423-336.000.

Klemen, Donald, to General Motors Corporation. Power transmission. 4,976,670, Cl. 475-278.000.

Klicker, Helmut: *See—*
Ohba, Noriaki; Tabata, Yujin; Nagatsuka, Masaaki; Nagatomi, Tateyuki; and Klicker, Helmut, 4,976,743, Cl. 8-543.000.

Klima, Hubertus; Schutz, Erwin; and Vollbrecht, Heinz-Rudiger, to SKW Trostberg Aktiengesellschaft. Process for the decaffeination of tea. 4,976,979, Cl. 426-427.000.

Klingenbeck, Georg: *See—*
Noerskau, Juergen; and Klingenbeck, Georg, 4,976,106, Cl. 60-452.000.

Klinksiek, Bernd: *See—*
Schlossmann, Klas; Zembrod, Alfred; Kazda, Stanislav; Serno, Peter; and Klinksiek, Bernd, 4,976,964, Cl. 424-450.000.

Klopman, Gilles: *See—*
Cesa, Mark C.; Rinz, James E.; Klopman, Gilles; and Kopp, Teodora T., 4,977,272, Cl. 548-336.000.

Knakrick, Edward. Storage means, especially parking means. 4,976,580, Cl. 414-254.000.

Kneen, Geoffrey; Jackson, William P.; Islip, Peter J.; and Wates, Peter J., to Burroughs Wellcome Co. Method of treating inflammation. 4,977,188, Cl. 514-575.000.

Kneip, Fernand, to Goodyear Tire & Rubber Company, The. Expandable tire building drum. 4,976,804, Cl. 156-401.000.

Knight, Alan D.: *See—*
Dibble, Eric P.; and Knight, Alan D., 4,976,626, Cl. 439-67.000.

Knize, Randall J.; and Cecchi, Joseph L., to United States of America, Energy. Hydrogen isotope separation utilizing bulk getters. 4,976,938, Cl. 423-249.000.

Knop, Klaus; and Wolters, Gunter, to MAN Gutehoffnungshutte. Method and apparatus for the thermal treatment of waste materials. 4,976,611, Cl. 432-181.000.

Ko, Herbert, to Hewlett-Packard Company. Nonhysteretic periodic-threshold SQUID comparator and A/D converter. 4,977,402, Cl. 341-133.000.

Kobayashi, Chuzo: *See—*
Higuchi, Noboru; Kobayashi, Chuzo; Ichikawa, Yasunori; Matsui, Keizo; and Yamaguchi, Shigeru, 4,976,377, Cl. 222-55.000.

Kobayashi, Kingo: *See—*
Aonuma, Masashi; Okita, Tsutomu; Hashimoto, Hiroshi; and Kobayashi, Kingo, 4,976,989, Cl. 427-48.000.

Kobayashi, Masao: *See—*
Suzuki, Toshiaki; Murakami, Yoji; Kobayashi, Masao; and Yamauchi, Osamu, 4,977,442, Cl. 357-70.000.

Kobayashi, Naotake: *See—*
Fujiwara, Yoshio; Kobayashi, Naotake; Shinohara, Satoru; and Abe, Tetsuya, 4,977,136, Cl. 503-227.000.

Kobayashi, Nobuaki: *See—*
Fukuoka, Mitsuhiro; Kobayashi, Nobuaki; and Tamiya, Fumiyuki, 4,976,564, Cl. 401-206.000.

Kobayashi, Satomi: *See—*
Nakajima, Tadakatsu; Kuwahara, Heikichi; Ohashi, Shigeo; Satoh, Motohiro; Yamada, Toshihiro; Kasai, Kenichi; Kobayashi, Satomi; and Watanabe, Akihide, 4,977,444, Cl. 357-82.000.

Kobayashi, Shiro; Itoh, Masahiko; and Izumiya, Masakiyo, to Hitachi, Ltd. Semiconductor module and an electronic computer using the semiconductor module. 4,977,443, Cl. 357-82.000.

Kobayashi, Takaaki: *See—*
Itagaki, Takaharu; Okada, Hiroyoshi; Miyake, Masao; Kobayashi, Takaaki; Tosa, Takahumi; and Satou, Hiroyuki, 4,976,976, Cl. 426-69.000.

Kobayashi, Toshitaka: *See—*
Akazawa, Toshiyuki; Okaya, Takuji; Inoue, Takashi; and Kobayashi, Toshitaka, 4,977,212, Cl. 525-57.000.

Koda, Yutaka: *See—*
Kanno, Takao; Koda, Yutaka; and Nagato, Hirokazu, 4,976,883, Cl. 252-62.520.

Kohata, Mitsuhiro: *See—*
Ino, Masumitsu; Kohata, Mitsuhiro; Itagaki, Masanori; Nagata, Takehito; and Tanaka, Hiroyuki, 4,977,304, Cl. 250-208.100.

Kohda, Katsuhiro: *See—*
Arakawa, Satoshi; Nonomura, Masamitu; Ogoda, Makoto; Torii, Shumpeita; and Kohda, Katsuhiro, 4,977,327, Cl. 250-484.100.

Kohl, Walter; and Nagel, Karl, to Robert Bosch GmbH. Device for protecting an electrical circuit against interference pulses. 4,977,340, Cl. 307-520.000.

Kohlman, Susan D.: *See—*
Chin, Tim; and Kohlman, Susan D., 4,977,295, Cl. 174-35.0GC.

Kohno, Akiyoshi; and Mikoshiba, Atsushi, to NEC Corporation. CCD image sensor with vertical overflow drain. 4,977,584, Cl. 377-58.000.

Koide, Tokuo: *See—*
Ohta, Mitsuaki; Koide, Tokuo; Suzuki, Takeshi; Matsuhisa, Akira; Yanagisawa, Isao; and Miyata, Keiji, 4,977,175, Cl. 514-394.000.

Koizumi, Masahiro: *See—*
Nakajima, Makoto; Ohashi, Yoshio; Chuma, Toshio; Hatori, Kazuo; Araki, Isao; Koizumi, Masahiro; Onuki, Jin; Suzuki, Hitoshi; and Okikawa, Susumu, 4,976,393, Cl. 228-111.000.

Koizumi, Noboru: *See—*
Matsumura, Takeshi; and Koizumi, Noboru, 4,976,525, Cl. 350-432.000.

Koizumi, Shigeo: *See—*
Okazaki, Masaki; Yamamuro, Kiyohiko; Koizumi, Shigeo; and Shiba, Keisuke, 4,977,076, Cl. 430-583.000.

Koizumi, Taichi: *See—*
Hashimoto, Kazuhiko; Koizumi, Taichi; Kawakita, Kenji; and Nomura, Noboru, 4,976,818, Cl. 156-643.000.

Kojima, Akira: *See—*
Ichikawa, Yasunori; Yamaguchi, Shigeru; Ohnishi, Hiroshi; Kojima, Akira; and Kato, Akira, 4,976,404, Cl. 251-121.000.

Kojima, Ryoji: *See—*
Oba, Sayoko; Muroi, Katsumi; Okuna, Kenji; Ohtsuka, Hidefumi; Iimura, Tsutomu; Kojima, Ryoji; and Kurihara, Keisuke, 4,977,415, Cl. 346-155.000.

Kokusai Denshin Denwa Co., Ltd.: *See—*
Ryu, Shiro; and Mochizuki, Kiyohumi, 4,977,564, Cl. 372-32.000.

Koleske, Joseph V.; and Kwiatkowski, George T., to Union Carbide Chemicals and Plastics Company Inc. Photo curable blends of 2-methyoxytetrahydropyran and a cycloaliphatic diepoxide. 4,977,199, Cl. 522-31.000.

KOMET Stahlhalter- und Werkzeugfabrik Robert Breuning GmbH: *See—*
Muendlein, Werner; Scheer, Gerhard; and Stolz, Gerhard, 4,976,574, Cl. 409-232.000.

Komori, Shin; Zauma, Jun; and Watanabe, Yoshiaki, to Canon Kabushiki Kaisha. Optical scanning device. 4,977,412, Cl. 346-108.000.

Komoriya, Haruhiko: *See—*
Maruyama, Yutaka; and Komoriya, Haruhiko, 4,977,232, Cl. 528-185.000.

Kompis, Ivan: *See—*
Jolidon, Synese; Locher, Rita; Kompis, Ivau; Weiss, Ekkehard; and Wyss, Pierre-Charles, 4,977,265, Cl. 544-363.000.

Kondo, Katsumi: *See—*
Ozawa, Sinya; Kondo, Katsumi; and Saito, Kajin, 4,976,777, Cl. 75-255.000.

Kondo, Masaki: *See—*
Yamamoto, Saburo; Hosoda, Masahiro; Sasaki, Kazuaki; and Kondo, Masaki, 4,977,568, Cl. 372-46.000.

Kondo, Mitsuru: *See*—
Tsuchida, Tetsuo; Meguro, Tatsuya; Seyama, Fumio; and Kondo, Mitsuru, 4,977,132, Cl. 503-220.000.

Kondo, Shigeo; and Sotomura, Tadashi, to Matsushita Electrical Indust. Co. Solid electrochemical element and production process therefor. 4,977,007, Cl. 428-76.000.

Kondo, Syugo: *See*—
Tanaka, Kouji; Kondo, Syugo; Imura, Takeshi; Ando, Katsuhiko; and Nakabayashi, Shigemitsu, 4,976,305, Cl. 164-458.000.

Kondo, Yuji, to Kabushiki Kaisha Toshiba. Magnetic tape high-speed braking apparatus. 4,977,467, Cl. 360-74.100.

Konica Corporation: *See*—
Ishige, Osamu; Masukawa, Toyoaki; Kida, Shuji; and Hirabayashi, Shigeto, 4,977,073, Cl. 430-549.000.
Usagawa, Yasushi; and Ishii, Fumio, 4,977,063, Cl. 430-264.000.

Konig, Herbert; and Dinkelmann, Friedrich, to Zinser Textilmaschinen GmbH. Method of and apparatus for detecting the degree of filling of supply spools on a spinning or twisting frame. 4,977,331, Cl. 250-560.000.

Konings, Leonardus U. E.: *See*—
Bergervoet, Jozef R. M.; and Konings, Leonardus U. E., 4,977,354, Cl. 315-248.000.

Konishi, Kunihiko: *See*—
Kato, Yasuyoshi; Teshima, Nobue; Ohta, Masao; and Konishi, Kunihiko, 4,977,128, Cl. 502-328.000.

Konishiroku Photo Industry Co., Ltd.: *See*—
Iijima, Toshifumi; Yamada, Yoshitaka; Kumashiro, Kenji; Akamatsu, Hideo; and Kamio, Takashi, 4,977,069, Cl. 430-506.000.

Konkle, Robert E. Utility surface supporting and stability structure. 4,976,204, Cl. 108-43.000.

Kontes Glass Company: *See*—
Straus, Daniel A.; and Babashak, John F., 4,976,927, Cl. 422-102.000.

Kopp, Teodora T.: *See*—
Cesa, Mark C.; Rinz, James E.; Klopman, Gilles; and Kopp, Teodora T., 4,977,272, Cl. 548-336.000.

Korber, Frank: *See*—
Maucksch, Thomas; Holzmann, Gottfried; and Korber, Frank, 4,977,607, Cl. 455-10.000.

Kordesch, Karl; and Uji, Ronald, to Battery Technologies Inc. Method and a taper charger for the resistance free charging of a rechargeable battery. 4,977,364, Cl. 320-21.000.

Korea Electronics & Communications Research Inst.: *See*—
Yu, Hyunkyu; Kang, Sangwon; and Lee, Jinhyo, 4,977,098, Cl. 437-31.000.

Korpela, Timo. Procedure for improving the efficiency of a steam power plant process. 4,976,107, Cl. 60-670.000.

Koaka, Genji; and Matoba, Keiko, to Sharp Kabushiki Kaisha. Hair dryer having adjustable height and air flow. 4,977,306, Cl. 392-380.000.

Kositpaiboon, Rungroj: *See*—
Phung, Van P. T.; and Kositpaiboon, Rungroj, 4,977,557, Cl. 370-85.600.

Kotaki, Hiroshi, to NEC Corporation. Method for fabricating semiconductor memory device. 4,977,099, Cl. 437-52.000.

Kotani, Hideo: *See*—
Okamoto, Tatsuo; Kotani, Hideo; Oono, Takio; Watabe, Kiyoto; Kinoshita, Yasushi; and Nishikawa, Yoshikazu, 4,977,105, Cl. 437-190.000.

Kotani, Kikuo: *See*—
Yamada, Hitoshi; Endo, Ken; and Kotani, Kikuo, 4,977,139, Cl. 514-11.000.

Kotani, Takaaki; and Takada, Seiji, to Fuji Photo Film Co., Ltd. Distance measuring device with plural differing reference voltages. 4,976,537, Cl. 356-1.000.

Kotobuki & Co., Ltd.: *See*—
Kageyama, Shuhei, 4,976,561, Cl. 401-75.000.

Kouda, Osamu: *See*—
Umemori, Noboru; Kouda, Osamu; and Horii, Yukio, 4,976,289, Cl. 138-122.000.

Koujina, Eiichi: *See*—
Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, 4,976,241, Cl. 123-425.000.

Koulin, Ge; Yunzhu, Wang; Xunmei, Yuan; and Peiming, Huang, to Interferon Sciences, Inc. Method of regenerating plantlets from mesophyll protoplasts of phaseolus angularis. 4,977,087, Cl. 435-240.470.

Kouzi, Tanagawa, to Oki Electric Industry Co., Ltd. Control circuit for EEPROM. 4,977,543, Cl. 365-218.000.

Kovacevic, Steven; Miller, James R.; Veal, Loraine E.; and Wood, John S., to Eli Lilly and Company. Vector comprising signal peptide-encoding DNA for use in Bacillus and other microorganisms. 4,977,089, Cl. 435-252.310.

Kovalev, Evgeny P.; Sushkin, Alexandr M.; Trubakov, Venediktovich; Shpektorov, Vladimir N.; and Shpektorov, Iosif N., to Spetsialnoe Konstruktorskoe Buro "Gazstroimashina". Rotary trench excavator. 4,976,051, Cl. 37-94.000.

Koves, William J., to UOP. Method of regenerating hydrocarbon conversion catalyst by coke burning. 4,977,119, Cl. 502-48.000.

Koyo Seiko Co., Ltd.: *See*—
Matsuoka, Hirofumi; and Tabuse, Hidetoshi, 4,977,507, Cl. 364-424.050.

Kozlov, Vladimir I.; Redkin, Vladimir F.; Kozyrev, Sergei A.; Borisov, Vasily N.; Boldyrev, Vladimir V.; Krebel, Fedor R.; and Rubtsov, Nikolai M. Centrifugal mill. 4,976,472, Cl. 241-172.000.

Kozuka, Kenji: *See*—
Nakasone, Takayoshi; Kozuka, Kenji; and Kimura, Haruo, 4,976,906, Cl. 264-139.000.

Kozuka, Yoshinari; and Kawaguchi, Shogo, to NGK Insulators, Ltd. Optical unit including electrooptical crystal elements. 4,976,517, Cl. 350-355.000.

Kozyrev, Sergei A.: *See*—
Kozlov, Vladimir I.; Redkin, Vladimir F.; Kozyrev, Sergei A.; Borisov, Vasily N.; Boldyrev, Vladimir V.; Krebel, Fedor R.; and Rubtsov, Nikolai M., 4,976,472, Cl. 241-172.000.

Kraemer, Sandy F., to New Discovery Ventures, Ltd. Yard casting assembly. 4,976,439, Cl. 273-350.000.

Kraft General Foods, Inc.: *See*—
Hirsh, Kenneth R.; Schanbacher, Larry M.; and Cha, Alice S., 4,976,983, Cl. 426-594.000.

Krakkay, Tibor; Poggi, Tatjana; and Schubert, Ernst, to Hoechst Aktiengesellschaft. Process for preparation of acrylonitrile polymers with low K value. 4,977,225, Cl. 526-93.000.

Kramer, Gary: *See*—
Holborow, Peter; and Kramer, Gary, 4,976,286, Cl. 137-625.430.

Kravitz, Leslie. Endodontic device. 4,976,615, Cl. 433-75.000.

Krebel, Fedor R.: *See*—
Kozlov, Vladimir I.; Redkin, Vladimir F.; Kozyrev, Sergei A.; Borisov, Vasily N.; Boldyrev, Vladimir V.; Krebel, Fedor R.; and Rubtsov, Nikolai M., 4,976,472, Cl. 241-172.000.

Krishnakumar, Suppayan M.; Friendship, Kenneth F. M.; Mahajan, Gautam K.; and Pocock, John F. E., to Continental Group, Inc., The. Ribbed preform for use in the blow molding of a plastic material container. 4,977,005, Cl. 428-36.920.

Kromrey, Edward P.: *See*—
Decker, James D.; Burch, Wendell D.; Brady, Daniel F.; Hinzman, Gary W.; Kromrey, Edward P.; Sanville, Katherine M.; Southworth, Donald R.; Chace, Mark S.; and Peloquin, Perry M., 4,976,137, Cl. 73-53.000.

Krueger, Robert E. Construction plate. 4,976,085, Cl. 52-715.000.

Kruit, Pieter; and Van Der Mast, Karel D., to U.S. Philips Corporation. Charged particle beam apparatus. 4,977,324, Cl. 250-396.0ML.

Krupp, Stephen P.; and Gessner, Scott L., to Dow Chemical Company, The. Elastic carbon fibers. 4,977,023, Cl. 428-367.000.

Kubach, Hans: *See*—
Graner, Juergen; Kirchner, Marcel; and Kubach, Hans, 4,976,405, Cl. 251-129.160.

Kubala, Zbigniew, to Deublin Company. Coolant union with fluid actuated seal assembly. 4,976,282, Cl. 137-580.000.

Kubo, Isamu: *See*—
Seki, Kamehru; and Kubo, Isamu, 4,976,573, Cl. 409-138.000.

Kubo, Keishi: *See*—
Hotta, Yoshihiko; and Kubo, Keishi, 4,977,030, Cl. 428-447.000.

Kubo, Takashi: *See*—
Nagashima, Yasuo; Soeda, Haruo; Sato, Masamichi; and Kubo, Takashi, 4,976,020, Cl. 29-90.010.

Kudo, Shigeji; Suzuki Sanae; Mirota, Hideaki; and Suzuki, Hiroo, to Yazaki Corporation. Method and apparatus for making specified-length wires for wire harness. 4,976,294, Cl. 140-102.000.

Kudoh, Yasunori: *See*—
Yamaguchi, Morio; Kudoh, Yasunori; and Nakazato, Takashi, 4,976,553, Cl. 400-124.000.

Kukanskis, Peter E.: *See*—
Bach, Wolf; Ferrier, Donald R.; Kukanskis, Peter E.; Williams, Ann S.; and Senechal, Mary J., 4,976,990, Cl. 427-98.000.

Kulitz, Guenter, to ESTA Apparatebau GmbH & Co. KG. Suction apparatus. 4,976,850, Cl. 210-104.000.

Kumaki, Jiro, to Research Development Corp. of Japan. Ultra fine polymer particle, composite material thereof and methods of preparation thereof. 4,977,242, Cl. 528-499.000.

Kumashiro, Kenji: *See*—
Iijima, Toshifumi; Yamada, Yoshitaka; Kumashiro, Kenji; Akamatsu, Hideo; and Kamio, Takashi, 4,977,069, Cl. 430-506.000.

Kume, Yuji: *See*—
Ihama, Mikio; Kume, Yuji; Tamoto, Koji; Takehara, Hiroshi; and Arai, Masao, 4,977,075, Cl. 430-567.000.

Kummer, Wolfgang: *See*—
Webwer, Theodor A.; and Kummer, Wolfgang, 4,976,779, Cl. 75-363.000.

Kuo, Wen-Chieh; Lin, Chia-Hui; Chou, Te-Chang; and Liang, Yuan-Hsiung, to Sysgration Ltd. Touch-control computer house. 4,977,397, Cl. 340-710.000.

Kuramoto, Yasuhiro: *See*—
Aoyagi, Sakae; Hayashi, Takaaki; and Kuramoto, Yasuhiro, 4,977,256, Cl. 540-227.000.

Kuraray Co., Ltd.: *See*—
Akazawa, Toshiyuki; Okaya, Takuji; Inoue, Takashi; and Kobayashi, Toshitaka, 4,977,212, Cl. 525-57.000.

Kurcbart, Robert, to Motorola, Inc. Wristband with loop antenna. 4,977,614, Cl. 455-193.000.

Kureha Kagaku Kogyo K. K.: *See*—
Mizuno, Toshiya; Teramoto, Yoshikichi; Saito, Takeshi; and Wakabayashi, Juichi, 4,976,908, Cl. 264-210.200.

Kureha Kagaku Kogyo Kabushiki Kaisha: *See*—
Iwasaki, Takao; Horikoshi, Katsumi; and Yoshiji, Yuzo, 4,976,825, Cl. 203-71.000.

Kurihara, Keisuke: *See—*
Oba, Sayoko; Muroi, Katsumi; Okuna, Kenji; Ohtsuka, Hidefumi; Iimura, Tsutomu; Kojima, Ryoji; and Kurihara, Keisuke, 4,977,415, Cl. 346-155.000.
Kurimoto, Ltd.: *See—*
Arakawa, Kazuki, 4,976,470, Cl. 241-37.000.
Kurita, Masayuki: *See—*
Tsujimoto, Yasuhiro; Kurita, Masayuki; and Aoki, Masaru, 4,976,473, Cl. 242-67.10R.
Kuritza, Alex P.: *See—*
Salyers, Abigail A.; and Kuritza, Alex P., 4,977,251, Cl. 536-27.000.
Kurokawa, Hiroshi: *See—*
Okamoto, Masaya; and Kurokawa, Hiroshi, 4,977,233, Cl. 528-198.000.
Kuroki Kogyosho Co., Ltd.: *See—*
Kuroki, Takanori, 4,976,915, Cl. 419-8.000.
Kuroki, Takanori, to Kuroki Kogyosho Co., Ltd. Method for forming a powdered or a granular material. 4,976,915, Cl. 419-8.000.
Kuroki, Toshio: *See—*
Chiyajo, Masanobu; Kuroki, Toshio; and Sakata, Eiji, 4,977,042, Cl. 429-49.000.
Kurosawa, Kimimasa; Harada, Chikao; Sakai, Hiroshi; and Niwa, Minoru, to Colin Electronics Co., Ltd. Pressure-pulse-wave detecting apparatus. 4,976,268, Cl. 128-687.000.
Kurrasch, Andrew J.: *See—*
Kelley, James O.; Williams, George A.; Kurrasch, Andrew J.; and Hollington, Geoffrey A., 4,976,502, Cl. 312-322.000.
Kurzweg, Ulrich H., to University of Florida. Heat exchanger employing fluid oscillation. 4,976,311, Cl. 165-84.000.
Kusaka, Yosuke; and Utagawa, Ken, to Nikon Corporation. Camera with focus detecting device for removing vignetting effects. 4,977,311, Cl. 250-201.800.
Kuster, Hans-Werner; and Vanaschen, Luc, to Saint-Gobain Vitrage International. Device for positioning heated glass sheets without deformation. 4,976,766, Cl. 65-289.000.
Kusumoto, Takehiro: *See—*
Kayane, Yutaka; Omura, Takashi; Harada, Naoki; Mori, Yasuji; Yamamoto, Yosuke; Miyamoto, Tetsuya; and Kusumoto, Takehiro, 4,977,261, Cl. 544-199.000.
Kusunoki, Shigeru: *See—*
Maehara, Naoyoshi; Bessyo, Daisuke; Matsumoto, Takahiro; and Kusunoki, Shigeru, 4,977,301, Cl. 219-10.55B.
Kutz, Donald A.; and Fasen, Kenneth R., to H.M. Electronics, Inc. Wireless communication apparatus and method of operating same. 4,977,610, Cl. 455-120.000.
Kuwahara, Heikichi: *See—*
Nakajima, Tadakatsu; Kuwahara, Heikichi; Ohashi, Shigeo; Satoh, Motohiro; Yamada, Toshihiro; Kasai, Kenichi; Kobayashi, Satomi; and Watanabe, Akihide, 4,977,444, Cl. 357-82.000.
Kuwavara, Ryuzi: *See—*
Yano, Hisashi; Yabumoto, Junsuke; and Kuwavara, Ryuzi, 4,976,854, Cl. 210-168.000.
Kuzuya, Susumu; Shimizu, Seiji; Kato, Mikio; Ishikawa, Yujiro; Sakai, Takashi; and Yuki, Eiji, to Brother Kogyo Kabushiki Kaisha. Device for feeding recording medium in the longitudinal recording direction. 4,976,558, Cl. 400-615.200.
Kwan-Gett, Clifford S. Artificial pericardium. 4,976,730, Cl. 623-3.000.
Kwiatkowski, George T.: *See—*
Koleske, Joseph V.; and Kwiatkowski, George T., 4,977,199, Cl. 522-31.000.
Kyocera Corporation: *See—*
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; and Mikami, Nakao, 4,976,705, Cl. 604-304.000.
Kawamura, Takao; Miyamoto, Naooki; Ito, Hiroshi; Takemura, Hitoshi; and Ishibutsu, Kokichi, 4,977,050, Cl. 430-57.000.
Kyoto University of Honmachi: *See—*
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.
Kyushu Hitachi Maxell, Ltd.: *See—*
Chiyajo, Masanobu; Kuroki, Toshio; and Sakata, Eiji, 4,977,042, Cl. 429-49.000.
L-Tec Company: *See—*
Severence, Wayne S., Jr., 4,977,305, Cl. 219-121.390.
Laapotti, Jorma, to Valmet Paper Machinery Inc. Method for hot-pressing of a web. 4,976,820, Cl. 162-206.000.
Laapotti, Jorma, to Valmet Oy. Press section with separate press zones in a paper machine. 4,976,821, Cl. 162-360.100.
Laboratorium Prof. Dr. Rudolf Berthold: *See—*
Schiek, Burkhard; and Uwe, Gartner F., 4,977,376, Cl. 324-613.000.
Lacrouts-Cazenave, Joel G., to Lacrouts Cazenave Sarl. Method of punching bar codes in a metal strip. 4,976,179, Cl. 83-50.000.
Lacrouts Cazenave Sarl: *See—*
Lacrouts-Cazenave, Joel G., 4,976,179, Cl. 83-50.000.
Lagana, Robert. Valve spring compression tool. 4,976,280, Cl. 137-315.000.
Lalo, Jack: *See—*
Garrigue, Roger; and Lalo, Jack, 4,977,237, Cl. 528-230.000.
Garrigue, Roger; and Lalo, Jack, 4,977,238, Cl. 528-230.000.
Lam, Pak-Lee, to Quanta Computer Inc. Connecting device for portable computers. 4,976,007, Cl. 16-302.000.
Lam Research Corporation: *See—*
Monkowski, Joseph R.; and Logan, Mark A., 4,976,996, Cl. 427-255.500.
Lambert, James M.: *See—*
Walder, Anthony J.; Solomon, Donald D.; Beck, Richard W.; Lambert, James M.; Ignatius, Timothy; and Crawford, Mark, 4,976,697, Cl. 604-164.000.
Lamy, Bernard: *See—*
Bichon, Daniel; and Lamy, Bernard, 4,976,962, Cl. 424-424.000.
Landanger, Joel; and Michel, Jean P., to ICP France. Aiming device to position at least one fixing component of the centromedullar nail type, through an implant. 4,976,713, Cl. 606-62.000.
Landy, Wady N. Pharmaceutical composition and method for treatment of digestive disorders. 4,976,970, Cl. 424-705.000.
Lane, Barry L.: *See—*
Marin, Robert J.; and Lane, Barry L., 4,977,380, Cl. 331-74.000.
Lane, Perry L.; and Shettigar, Udipi R. Methods and apparatus for autologous blood recovery. 4,976,682, Cl. 604-4.000.
Lane, Richard: *See—*
Huffman, Dennis D.; Hughes, Robert C.; Kelsey, Charles A.; Lane, Richard; Ricco, Antonio J.; Snelling, Jay B.; and Zipperian, Thomas E., 4,976,266, Cl. 128-659.000.
Lang, Gunther; and Wendel, Harald, to Wella Aktiengesellschaft. Macromolecular, surface-active, quaternary, N-substituted chitosan derivatives as well as cosmetic composition based on these new chitosan derivatives. 4,976,952, Cl. 424-47.000.
Langdon, Albert K.; Learmont, Robert O.; Robinson, Darrell; Goozen, Robert; Lewis, Michael; Williams, John; Pruehs, Allen V.; and Shincovich, John T., to Ekstrom Industries, Inc. Watthour meter socket adapter with interface connection. 4,977,482, Cl. 361-366.000.
LaPalme, Stephen G., to Power Solutions, Inc. Circuit breaker current monitoring. 4,977,513, Cl. 364-483.000.
Larin, Marxen P. Cryogenic condensation pump. 4,976,111, Cl. 62-55.500.
Larson, Lawrence E., to Hughes Aircraft Company. Digital correction circuit for data converters. 4,977,403, Cl. 341-143.000.
Latta, Garland H., Jr.: *See—*
Malcolm, Timothy M.; and Latta, Garland H., Jr., 4,977,316, Cl. 250-231.130.
Lattion, Andre: *See—*
Meyer, Urs; and Lattion, Andre, 4,976,098, Cl. 57-308.000.
Laurel Kaihatsu Co., Ltd.: *See—*
Serizawa, Seijiro, 4,976,436, Cl. 273-162.00E.
Laurent, Sebastian M.; and Sanders, Robert N., to Ethyl Corporation. Zeolites in poultry nutrition. 4,976,971, Cl. 426-2.000.
Lautenschlager, Karl, to Karl Lautenschlager GmbH & Co. KG. Furniture hinge. 4,976,006, Cl. 16-238.000.
Lavelle, Edwin F., Jr. Method for fish cleaning. 4,976,010, Cl. 452-116.000.
Lawrence, Paul B.: *See—*
Fagerburg, David R.; Watkins, Joseph J.; Lawrence, Paul B.; and Rule, Mark, 4,977,236, Cl. 528-226.000.
Watkins, Joseph J.; Fagerburg, David R.; Lawrence, Paul B.; and Rule, Mark, 4,977,224, Cl. 525-471.000.
Lazaro, Eulogio D., to Glidden Company, The. Oxidizers for cathodic electrocoating process. 4,976,836, Cl. 204-181.700.
Leake, Donald, to Research and Education Institute, Inc. Bone reconstruction. 4,976,737, Cl. 623-16.000.
Learmont, Robert O.: *See—*
Langdon, Albert K.; Learmont, Robert O.; Robinson, Darrell; Goozen, Robert; Lewis, Michael; Williams, John; Pruehs, Allen V.; and Shincovich, John T., 4,977,482, Cl. 361-366.000.
Learn, Keith S.: *See—*
Huang, Fu-Chih; Campbell, Henry F.; Learn, Keith S.; and Galemmo, Robert A., Jr., 4,977,162, Cl. 514-314.000.
LeBlanc, Ewart O., to Xerox Corporation. Process for assembling smaller scanning or printing arrays together to form a longer array. 4,976,802, Cl. 756-273.500.
LeBlanc, Robert: *See—*
Boivin, Richard F.; Huni, Jean-Paul R.; and LeBlanc, Robert, 4,976,841, Cl. 204-243.00M.
Lebrun, Michel: *See—*
Crozat, Georges; and Lebrun, Michel, 4,976,117, Cl. 62-480.000.
Leda Logarithmic Electrical Devices for Automation S.r.l.: *See—*
Lodini, Paolo, 4,977,386, Cl. 338-114.000.
Lederle (Japan), Ltd.: *See—*
Aoyagi, Sakae; Hayashi, Takaaki; and Kuramoto, Yasuhiro, 4,977,256, Cl. 540-227.000.
Lednor, Peter W., to Shell Oil Company. Process for the preparation of silicon oxynitride-containing products. 4,977,125, Cl. 502-200.000.
Lee, Chung Y. Control valve means for use in a filtration apparatus for treating waste product. 4,976,853, Cl. 210-107.000.
Lee Colortran Inc.: *See—*
Cunningham, David W.; and Esakoff, Gregory F., 4,977,484, Cl. 361-429.000.
Lee, Irene H.: *See—*
Lee, William C.; and Lee, Irene H., 4,976,215, Cl. 116-215.000.
Lee, Jinhyo: *See—*
Yu, Hyunkyu; Kang, Sangwon; and Lee, Jinhyo, 4,977,098, Cl. 437-31.000.
Lee, Keun C., to Goldstart Co. Ltd. High-speed searching apparatus for CDP. 4,977,539, Cl. 369-44.110.
Lee, Leonard G.; and McLean, Francis A., to Lee Valley Tools Ltd. Machine setting gauge. 4,976,046, Cl. 33-640.000.
Lee, Naisin. Water distillation and aeration apparatus. 4,976,824, Cl. 202-172.000.
Lee, Richard M., to Westinghouse Electric Corp. System and method for heat recovery in a combined cycle power plant. 4,976,100, Cl. 60-39.020.

Lee, Robert T.: *See*—
Ramoe, Frank; and Lee, Robert T., 4,976,487, Cl. 296-152.000.
Lee, Seung J., to Samsung Electron Devices Co., Ltd. Direct-heated cathode structure and method for the fabrication thereof. 4,976,643, Cl. 313-276.000.
Lee, Ted C. K.; and Hrinda, Michael E., to Rorer Pharmaceutical Corporation. High recovery process for antihemophilic factor. 4,977,246, Cl. 530-383.000.
Lee, Timothy: *See*—
Fahnestock, Stephen R.; Lee, Timothy; and Wroble, Marie H., 4,977,247, Cl. 530-387.000.
Lee Valley Tools Ltd.: *See*—
Lee, Leonard G.; and McLean, Francis A., 4,976,046, Cl. 33-640.000.
Lee, William C.; and Lee, Irene H. Door activity monitoring apparatus. 4,976,215, Cl. 116-215.000.
Lee, Yungli J.; Benson, Lewis B.; and College, John W., to Dravo Lime Company. Sulfur dioxide removal from flue gases with sulfite oxidation inhibition. 4,976,937, Cl. 423-242.000.
Leech, Gerald W.: *See*—
Phelps, Frankie E.; and Leech, Gerald W., 4,977,113, Cl. 501-98.000.
Leeflang, Willem E.: *See*—
Thornton, Theodore W.; and Leeflang, Willem E., 4,976,022, Cl. 29-227.000.
Lefevre, Jean Patrick, to Societe Anonyme dite: Compagnie Generale d'Automatisme CGA-HBS. Fare collection system using microwaves. 4,977,501, Cl. 364-401.000.
Leichter, Louis M.: *See*—
Jongewaard, Susan K.; Smith, Terrance P.; Leichter, Louis M.; and Zaklika, Krzysztof A., 4,977,134, Cl. 503-227.000.
Leichtung Inc.: *See*—
Gibson, Jeremy H., 4,976,298, Cl. 144-249.00B.
Leismer, Dwayne D., to Camco International Inc. Well tool hydrostatic release means. 4,976,317, Cl. 166-321.000.
Leisure, Ronald K.: *See*—
Yoder, Douglas J.; Brown, Ronald E.; Stevenson, Paul E.; Hornback, Donald L.; and Leisure, Ronald K., 4,977,101, Cl. 437-51.000.
Leivenzon, Simon: *See*—
Lotznicker, Lucio; Hawkins, Raymond R.; Karban, George; Leivenzon, Simon; and Leivenzon, Zvi, 4,976,168, Cl. 74-625.000.
Leivenzon, Zvi: *See*—
Lotznicker, Lucio; Hawkins, Raymond R.; Karban, George; Leivenzon, Simon; and Leivenzon, Zvi, 4,976,168, Cl. 74-625.000.
Lejard, Jean-Yves: *See*—
Fonsalas, Frederic; Hayet, Pascal; Lejard, Jean-Yves; and Le Queau, Marcel, 4,977,453, Cl. 358-138.000.
Leland Stanford Junior University, The Board of Trustees of the: *See*—
Tatchyn, Roman O.; Csonka, Paul L.; and Cremer, Jay T., 4,977,384, Cl. 335-210.000.
Leleve, Joel, to Cibie Projecteurs. Method and circuit for controlling a position-controlling DC motor and a system for controlling linear displacement in accordance with the method. 4,977,360, Cl. 318-596.000.
Le Marchand, Claude, to Bendix France. Disc brake and support system for such a brake. 4,976,339, Cl. 188-73.450.
Lembeck, Theo: *See*—
Brockmanns, Karl-Josef; and Lembeck, Theo, 4,976,099, Cl. 57-411.000.
Lemieux, Paul R.: *See*—
Rumpf, David S.; and Lemieux, Paul R., 4,977,116, Cl. 501-128.000.
Lentino, Lynn E., to Black & Decker Inc. Thrust bearing arrangement for a power tool transmission. 4,976,164, Cl. 74-50.000.
Leonov, Mark; and de Groot, Roy, to Intel Corporation. Tube particle vacuum cleaner. 4,976,002, Cl. 15-304.000.
Le Queau, Marcel: *See*—
Fonsalas, Frederic; Hayet, Pascal; Lejard, Jean-Yves; and Le Queau, Marcel, 4,977,453, Cl. 358-138.000.
Lesieur, Roger R.: *See*—
Szydlowski, Donald F.; and Lesieur, Roger R., 4,976,747, Cl. 48-127.900.
Lesmerises, Normand: *See*—
Delvaux, Pierre; and Lesmerises, Normand, 4,976,884, Cl. 252-62.000.
Leupold, Ernst I., to Hoechst Aktiengesellschaft. Process for preparing carboxylic acids. 4,976,893, Cl. 260-413.000.
Leupold, Ernst I.; Wiesner, Matthias; Schlingmann, Merten; and Rapp, Knut, to Hoechst Aktiengesellschaft. Process for the oxidation of 5-hydroxymethylfurfural. 4,977,283, Cl. 549-484.000.
Levinson, Robert S.: *See*—
Gauthier, Robert J.; and Levinson, Robert S., 4,976,683, Cl. 604-29.000.
Levterov, Alexandr I.: *See*—
Gershuni, Alexandr N.; Maisotsenko, Valery S.; Kaminnik, Alexandr A.; Zaripov, Vladilen K.; Nischik, Alexandr P.; and Levterov, Alexandr I., 4,976,113, Cl. 62-314.000.
Levy, Abner. Carrier package for biological speciman slide. 4,976,354, Cl. 206-456.000.
Levy, Edward H., to EHL Development Inc. Keyboard cleaner. 4,975,999, Cl. 15-210.00R.
Levy, Nessim I.; Dyn, Nira; and Rippa, Samuel, to "XI" Information Processing Systems Ltd. Method and apparatus for contouring data particularly useful in preparing topographic maps. 4,976,035, Cl. 33-1.00A.
Lew, Hyok S. Impulse sensor with balanced mass-stiffness distribution. 4,976,156, Cl. 73-861.240.
Lewins, Foster; and Gammons, Timothy S., to Coal Industry (Patents) Limited. Method and apparatus for steering a mining machine cutter. 4,976,495, Cl. 299-1.000.
Lewis, Michael: *See*—
Langdon, Albert K.; Learmont, Robert O.; Robinson, Darrell; Goozen, Robert; Lewis, Michael; Williams, John; Pruehs, Allen V.; and Shincovich, John T., 4,977,482, Cl. 361-366.000.
LGZ Landis & Gyr Zug: *See*—
Studer, Werner; Hagmann, Stefan; and Strotz, Marcel, 4,977,310, Cl. 235-375.000.
Liandris, Maria: *See*—
Edelstein, Fred; Liandris, Maria; and Brown, Richard F., 4,976,754, Cl. 55-159.000.
Liang, Rong-Chang; Simpson, William H.; Gyure, Katherine A.; and Carpenter, Kenneth P., to Mead Corporation, The. Sulfonated-ethylene oxide dispersants for use in preparing amine-formaldehyde microcapsules. 4,977,059, Cl. 430-138.000.
Liang, Rong-Chang; Hipps, Jesse, Sr.; and Chen, Jing-Den, to Mead Corporation, The. Method for producing microcapsules and photosensitive microcapsules produced thereby. 4,977,060, Cl. 430-138.000.
Liang, Yuan-Hsiung: *See*—
Kuo, Wen-Chieh; Lin, Chia-Hui; Chou, Te-Chang; and Liang, Yuan-Hsiung, 4,977,397, Cl. 340-710.000.
Liao, James C.: *See*—
Mohler, Robert D.; and Liao, James C., 4,977,523, Cl. 364-550.000.
Libin, Barry M. Oral hygiene composition. 4,976,955, Cl. 424-53.000.
Liebherr-Werk Ehingen GmbH: *See*—
Becker, Rudolf, 4,976,361, Cl. 212-231.000.
Lieske, Edgar: *See*—
Rose, David; Lieske, Edgar; and Maak, Norbert, 4,976,742, Cl. 8-412.000.
LifeScan, Inc.: *See*—
Nieto, Robert L.; and Rasmussen, Chris W., 4,976,724, Cl. 606-182.000.
Liland, Alfred: *See*—
Dorband, Glen C.; Liland, Alfred; Menezes, Edgar; Steinheuser, Peter; Popadiuk, Nicholas M.; and Failla, Stephen J., 4,976,909, Cl. 264-235.000.
Liljegren, Said D. Building structure having stacked wooden beam walls. 4,976,079, Cl. 52-233.000.
Lilly Industries Limited: *See*—
Chakrabarti, Jiban Kumar; and Hotten, Terrence M., 4,977,150, Cl. 514-220.000.
Limpel, Lawrence E.: *See*—
Barnes, Keith D.; Hotzman, Frederick W.; Limpel, Lawrence E.; and Magee, Thomas A., 4,976,770, Cl. 71-88.000.
Lin, Chia-Hui: *See*—
Kuo, Wen-Chieh; Lin, Chia-Hui; Chou, Te-Chang; and Liang, Yuan-Hsiung, 4,977,397, Cl. 340-710.000.
Linde Aktiengesellschaft: *See*—
Noerskau, Juergen; and Klingenbeck, Georg, 4,976,106, Cl. 60-452.000.
Linder, Donald L.; Goode, Steve H.; Kazecki, Henry L.; Dennis, Donald W.; and Baker, James C., to Motorola, Inc. Antenna selection control circuit. 4,977,616, Cl. 455-277.000.
Ling Dynamic Systems Limited: *See*—
Adams, Anthony B., 4,977,342, Cl. 310-20.000.
Lion Corporation: *See*—
Shindo, Nobuaki; Naruse, Seiji; Maeda, Fumiaki; Miyamoto, Yujirou; and Takeuchi, Toshio, 4,976,369, Cl. 220-270.000.
Lipparini, Mauro: *See*—
Saporiti, Roberto; Lipparini, Mauro; and Tapinassi, Roberto, 4,976,021, Cl. 29-91.100.
Liprie, Samuel F.: *See*—
Hayman, Michael H.; Morgan, Lee R.; and Liprie, Samuel F., 4,976,680, Cl. 600-7.000.
Lips, Hendrik R.: *See*—
Weisshaupt, Herbert P.; Orth, Hans; Lips, Hendrik R.; and Scheideler, Wilfried, 4,976,203, Cl. 102-476.000.
Lipsky, Milton H.; and Rosner, Andrew, to Rhode Island Hospital. Sample container. 4,976,923, Cl. 422-58.000.
Liquid Air Corporation: *See*—
Cooke, Steven J., 4,977,093, Cl. 436-119.000.
Lisop Oy: *See*—
Ryynanen, Seppo I., 4,976,875, Cl. 210-788.000.
Lithium Corporation of America: *See*—
Morrison, Robert C.; and Rathman, Terry L., 4,976,886, Cl. 252-182.300.
Litzenberger, Ernest N., to Bally Engineered Structures, Inc. Sandwich panel assembly. 4,976,081, Cl. 52-309.110.
Liu, Chung-Heng: *See*—
Meyers, Peter V.; Liu, Chung-Heng; and Frey, Timothy J., 4,977,097, Cl. 437-4.000.
Liu, Ru-Shi, to Industrial Technology Research Institute. Process for the preparation of the precursor used in the fabrication of Y—BA—CU—O superconductors using a solgel technique. 4,977,109, Cl. 505-1.000.
Livingston, Douglas A.; Pearlman, Bruce A.; and Denmark, Scott, to Upjohn Company, The. Steroidal 17α-silyl ethers and process to corticoids and progesterones. 4,977,255, Cl. 540-4.000.
LK-Products Oy: *See*—
Niiranen, Erkki O., 4,977,383, Cl. 333-219.000.

Locher, Rita: *See—*
Jolidon, Synese; Locher, Rita; Kompis, Ivan; Weiss, Ekkehard; and Wyss, Pierre-Charles, 4,977,265, Cl. 544-363.000.

Locke, Terry J. A.: *See—*
McAndless, John M.; Hancock, James R.; Barnett, Donald B.; Olm, Orville J.; Locke, Terry J. A.; and Maybank, John, 4,976,924, Cl. 422-99.000.

Loda, Michael A. Security alarm system and switch. 4,977,392, Cl. 340-568.000.

Lodini, Paolo, to Leda Logarithmic Electrical Devices for Automation S.r.l. Electric resistor producible in a wide range of specific resistance values, and relative manufacturing process. 4,977,386, Cl. 338-114.000.

Lodomez, Christian: *See—*
Ceron, Daniel; Lodomez, Christian; Hano, Paul; and Erard, Jose, 4,976,123, Cl. 70-369.000.

Loftus, Barry N.: *See—*
Ball, Keith V.; Halblander, Karl-Heinz; and Loftus, Barry N., 4,976,686, Cl. 604-61.000.

Logan, Mark A.: *See—*
Monkowski, Joseph R.; and Logan, Mark A., 4,976,996, Cl. 427-255.500.

Logobugs Limited: *See—*
Roberts, John L., 4,976,056, Cl. 40-299.000.

Long-Daugherty, Kathleen A.: *See—*
Blumenshine, Kent M.; Marcus, Harris L.; and Long-Daugherty, Kathleen A., 4,976,814, Cl. 156-277.000.

Long, Gary N.; Pellet, Regis J.; and Rabo, Jule A., to UOP. Conversion of crude oil feeds. 4,976,846, Cl. 208-114.000.

Long, Marianna: *See—*
Urry, Dan W.; and Long, Marianna, 4,976,734, Cl. 623-11.000.

Longrod, Scott J., to Smith Corona Corporation. Print carrier rack drive. 4,976,556, Cl. 400-320.000.

Lonza Ltd.: *See—*
Mills, Lester; and Previdoli, Felix, 4,977,264, Cl. 544-334.000.

Loos, Herbert: *See—*
Erhardt, Manfred; and Loos, Herbert, 4,976,044, Cl. 33-501.140.

Loose, Robert A.: *See—*
Munday, Mark L.; Doby, William P.; and Loose, Robert A., 4,977,368, Cl. 324-142.000.

L'Oreal: *See—*
Bazin, Roland M.; Obadia, Gerard; Marcotte, Louis; and Scot, Jean, 4,976,272, Cl. 128-774.000.

Lorec, Gerard: *See—*
Domenget, Jean-Pierre; and Lorec, Gerard, 4,977,491, Cl. 363-15.000.

Lorenzen, James W.: *See—*
Salemka, Mark E.; and Lorenzen, James W., 4,976,091, Cl. 53-467.000.

Loreth, Andrezej: *See—*
Torok, Vilmos; and Loreth, Andrezej, 4,976,752, Cl. 55-117.000.

Lotspeich-Irwin-Crotty, Inc.: *See—*
Lotspeich, Wayne D.; and Irwin, Lee R., 4,976,449, Cl. 280-79.400.

Lotspeich, Wayne D.; and Irwin, Lee R., to Lotspeich-Irwin-Crotty, Inc. Portable wheel dolly. 4,976,449, Cl. 280-79.400.

Lotznicker, Lucio; Hawkins, Raymond R.; Karban, George; Leivenzon, Simon; and Leivenzon, Zvi. Drive for a door operator. 4,976,168, Cl. 74-625.000.

Louis, William J.; Berthold, Richard; Seiler, Max-Peter; and Stoll, Andre, to Louis, William J. 3-aminopropyloxyphenyl derivatives, pharmaceutical compositions containing them and method for the therapy of diseases. 4,977,153, Cl. 514-237.500.

Lovelace, Richard R., to General Motors Corporation. Air velocity responsive self deploying flexing air dam. 4,976,489, Cl. 296-180.100.

Lowe, Jeffrey C.: *See—*
Newcombe, Haydn J.; and Lowe, Jeffrey C., 4,976,460, Cl. 236-12.120.

LTV Aerospace and Defense Co.: *See—*
Welch, Albert B.; and Scott, Marion W., 4,977,562, Cl. 372-32.000.

Lu, Shih-Lai: *See—*
Brown, Robert C.; and Lu, Shih-Lai, 4,977,003, Cl. 428-35.500.

Lubrizol Corporation, The: *See—*
Adams, Paul E., 4,976,881, Cl. 252-47.000.

Lucas Industries Public Limited Company: *See—*
Wixon, Philip A. M.; and Clarke, Denis K. C., 4,976,185, Cl. 89-35.010.

Lucas Weinschel Inc.: *See—*
Powell, Robert C., 4,977,366, Cl. 324-95.000.

Luchonok, Jeffrey J., to Advanced Sleep Products. Water mattress with vertically disposed dampening cells. 4,975,995, Cl. 5-450.000.

Ludwig, Frank A., to Hughes Aircraft Company. Sodium-sulfur thermal battery. 4,977,044, Cl. 429-104.000.

Luigi Franchi S.p.A.: *See—*
Marzocco, Alessandro, 4,976,059, Cl. 42-46.000.

Luly, Jay R.: *See—*
Rosenberg, Saul H.; Luly, Jay R.; and Plattner, Jacob J., 4,977,277, Cl. 549-215.000.

Lundell, Vance G. Segmented auger. 4,976,341, Cl. 198-666.000.

Lunn, Lawrence M. Doorstop. 4,976,479, Cl. 292-343.000.

Lustig, Stanley; Mack, Nancy M.; Schuetz, Jeffrey M.; and Vicik, Stephen J., to Viskase Corporation. Process for making puncture resistant, heat-shrinkable films containing very low density polyethylene. 4,976,898, Cl. 264-22.000.

Lynch, Gregory A., to Inter-City Products Corporation (USA). Warmup method for a two stage furnace. 4,976,459, Cl. 236-11.000.

Lynn, Scott, to University of California, Regents of the. Regeneration of solvent in H_2S removal from gases. 4,976,935, Cl. 423-222.000.

M & I Door Systems Limited: *See—*
Taylor, Douglas B., 4,976,302, Cl. 160-310.000.

Maak, Norbert: *See—*
Rose, David; Lieske, Edgar; and Maak, Norbert, 4,976,742, Cl. 8-412.000.

Maass, Klaus P., to Draftex Industries Limited. Sealing strips. 4,976,067, Cl. 49-377.000.

Macaluso, Vincent A., to Cornerboard, Inc. Packing container. 4,976,374, Cl. 220-453.000.

Macaulay, Norman, to Moore Business Forms, Inc. OCR scannable carbonless copying system and a method of producing OCR scannable images therewith. 4,977,131, Cl. 503-201.000.

MacDermid, Incorporated: *See—*
Bach, Wolf; Ferrier, Donald R.; Kukanskis, Peter E.; Williams, Ann S.; and Senechal, Mary J., 4,976,990, Cl. 427-98.000.

MacDonald, J. Gavin: *See—*
Nohr, Ronald S.; and MacDonald, J. Gavin, 4,976,788, Cl. 134-5.000.

Machold, Timothy R.; Mar, Craig E.; Mueller, Richard L., Jr.; and Shanahan, John P., to Advanced Cardiovascular Systems, Inc. Vascular catheters. 4,976,720, Cl. 606-194.000.

Mack, Nancy M.: *See—*
Lustig, Stanley; Mack, Nancy M.; Schuetz, Jeffrey M.; and Vicik, Stephen J., 4,976,898, Cl. 264-22.000.

Mackay, Frederick G.; and Wichman, William J., to Wichman, William John. Sunglasses with visor. 4,976,530, Cl. 351-44.000.

Mackenzie, John D.: *See—*
Goodwin, James M.; Rosen, Bruce E.; Vidal, Jacques J.; Mackenzie, John D.; and Wu, Edward T. H., 4,977,540, Cl. 365-49.000.

Mackin, Robert A. Working well balloon method. 4,976,710, Cl. 606-15.000.

Maclin, Neiman C.: *See—*
Miller, Benson L.; Scherer, Paul T.; and Maclin, Neiman C., 4,976,205, Cl. 108-47.000.

Maddrey, James G., Jr.: *See—*
McConnell, Bain C.; Jarvis, William R.; Demey, C. Fred, III; and Maddrey, James G., Jr., 4,976,326, Cl. 177-145.000.

Mader, Rudolf, to Asea Brown Boveri Ltd. Protection method and protection device for detecting asynchronism in the synchronous starting of a synchronous machine. 4,977,362, Cl. 318-713.000.

Madle, Wolfgang; Gawlik, Norbert; and Popp, Franz W., to Brennelementlager Gorleben GmbH. Apparatus for sealing a container for the storage of radioactive material. 4,976,912, Cl. 376-249.000.

Maeda, Fumiaki: *See—*
Shindo, Nobuaki; Naruse, Seiji; Maeda, Fumiaki; Miyamoto, Yuujirou; and Takeuchi, Toshio, 4,976,369, Cl. 220-270.000.

Maeda, Katsuya: *See—*
Horinouchi, Kazuo; and Maeda, Katsuya, 4,977,114, Cl. 501-104.000.

Maeda, Keikichi; Kagawa, Naohiko; Ishii, Kunio; and Iijima, Takahiro, to JGC Corporation. Carbon containing compound treating apparatus with resistance to carbon deposition. 4,976,932, Cl. 422-240.000.

Maeda, Takayoshi; Hata, Masahiko; Zempo, Yasunari; Fukuhara, Noboru; and Takata, Hiroaki, to Sumitomo Chemical Co., Ltd. Apparatus for vapor-phase growth. 4,976,216, Cl. 118-728.000.

Maehara, Naoyoshi; Bessyo, Daisuke; Matsumoto, Takahiro; and Kusunoki, Shigeru, to Matsushita Electric Industrial Co., Ltd. High-frequency heating apparatus using frequency-converter-type power supply. 4,977,301, Cl. 219-10.55B.

Maeshima, Tsugio: *See—*
Sakurada, Satoshi; Tagaya, Nobuaki; Miura, Tadashi; Maeshima, Tsugio; and Hashimoto, Takao, 4,977,120, Cl. 502-64.000.

Maestas, Joseph H.; and Pierson, Lyndon G., to United States of America, Energy. Cryptographic synchronization recovery by measuring randomness of decrypted data. 4,977,596, Cl. 380-48.000.

Maffrand, Jean-Pierre: *See—*
Bernat, Andre ; Delabassee, Denis; Frehel, Daniel; Maffrand, Jean-Pierre; and Vallee, Eric, 4,977,168, Cl. 514-330.000.

Magee, Thomas A.: *See—*
Barnes, Keith D.; Hotzman, Frederick W.; Limpel, Lawrence E.; and Magee, Thomas A., 4,976,770, Cl. 71-88.000.

Maggiulli, Cataldo A.: *See—*
Arnold, Robert W.; and Maggiulli, Cataldo A., 4,977,269, Cl. 548-262.400.

Magnier, Claude: *See—*
Fabre, Frederic; Tognet, Jean-Paul; and Magnier, Claude, 4,976,939, Cl. 423-21.100.

Magro, Alfred E., to Aries Medical, Inc. Pacer interface device. 4,976,681, Cl. 600-17.000.

Mahajan, Gautam K.: *See—*
Krishnakumar, Suppayan M.; Friendship, Kenneth F. M.; Mahajan, Gautam K.; and Pocock, John F. E., 4,977,005, Cl. 428-36.920.

Mahaney, Bernard F., Jr.; Beck, Carl W.; Nixon, Kim B.; Connolly, Randolph; and Nunemaker, Terry V., to Boeing Company, The. Captive self-locking mechanism. 4,976,576, Cl. 411-121.000.

Mahoney, Robert D.: *See—*
Beck, Henry N.; and Mahoney, Robert D., 4,976,901, Cl. 264-45.900.

Mahyera, Anil: *See—*
Mraz, Dennis Z.; and Mahyera, Anil, 4,976,571, Cl. 405-261.000.

Main, Ewan J.: *See—*
Evans, Alan G.; and Main, Ewan J., 4,975,996, Cl. 5-464.000.

Main, William E., to Motorola, Inc. Differential relaxation oscillator. 4,977,381, Cl. 331-111.000.

Mainwaring, David; and Cadzow, Mark, to Charlton Mineral Associates Pty. Ltd. Mineral recovery process. 4,976,781, Cl. 75-710.000.

Maisotsenko, Valery S.: *See*—
Gershuni, Alexandr N.; Maisotsenko, Valery S.; Kaminnik, Alexandr A.; Zaripov, Vladilen K.; Nischik, Alexandr P.; and Levterov, Alexandr I., 4,976,113, Cl. 62-314.000.

Maitoza, Paul: *See*—
Evans, Edwin R.; and Maitoza, Paul, 4,977,290, Cl. 556-459.000.

Majcherczyk, Andrzej: *See*—
Hutterman, Aloys; Majcherczyk, Andrzej; and Zadrazil, Frantisek, 4,977,090, Cl. 435-266.000.

Majco Building Specialties, L.P.: *See*—
Beal, Thomas J.; Karabin, Tadeusz; and Mundy, Roy E., 4,976,253, Cl. 126-512.000.

Makino, Naonori: *See*—
Ohno, Shigeru; Kitatani, Katsuji; Makino, Naonori; Hoshi, Satoshi; and Sato, Hideo, 4,977,051, Cl. 430-58.000.

Makita Electric Works, Ltd.: *See*—
Fushiya, Fusao; Hayashi, Akiharu; Itsuki, Fumiaki; and Nagata, Kunio, 4,977,358, Cl. 318-268.000.

Malcolm, Timothy M.; and Latta, Garland H., Jr., to Aerospace Controls Corporation. Encoder disc having a track formed by two regions of different radii. 4,977,316, Cl. 250-231.130.

Maldonado, Rene; Trinh, Toan; and Gosselink, Eugene P., to Procter & Gamble Company, The. Sulfoaroyl end-capped ester oligomers suitable as soil-release agents in detergent compositions and fabric-conditioner articles. 4,976,879, Cl. 252-8.700.

Mallaband, Anne: *See*—
Hatton, Kevin B.; Irving, Edward; Walshe, Josephine M. A.; and Mallaband, Anne, 4,977,293, Cl. 558-153.000.

Malmstrom, Rolf E.: *See*—
Elvander, Hans I.; and Malmstrom, Rolf E., 4,976,776, Cl. 75-483.000.

Maly, Zdenek, to Swiss Aluminium Ltd. Process for pretreating strips and foils of aluminum or aluminum alloys. 4,976,827, Cl. 204-15.000.

MAN Gutehoffnungshutte: *See*—
Knop, Klaus; and Wolters, Gunter, 4,976,611, Cl. 432-181.000.

Man Nutzfahrzeuge AG: *See*—
Hagin, Faust; and Flenker, Helmut, 4,976,665, Cl. 475-80.000.

Man Nutzfahrzeuge Aktiengesellschaft of Munchen: *See*—
Hagin, Faust; and Drewitz, Hans, 4,976,664, Cl. 475-80.000.

Mandell, Colleen J.: *See*—
Wesson, Caren L.; and Mandell, Colleen J., 4,976,645, Cl. 446-15.000.

Mandell, Neil, to C. M. Offray & Son, Inc. Decorative balloon structure. 4,976,649, Cl. 446-220.000.

Mangini, Richard J.; and Hartig, William J., to Pharmedix. Kit for distributing pharmaceutical products. 4,976,351, Cl. 206-232.000.

Mani, Krishnamurthy N.; Chlanda, Frederick P.; and Chiao, Yu-Chih, to Allied-Signal Inc. Method for purification of bases from materials comprising base and salt. 4,976,838, Cl. 204-182.300.

Mannesmann AG: *See*—
Pleschiutschnigg, Fritz-Peter; Parschat, Lothar; Burau, Armin; Rahmfeld, Werner; Moellers, Gerd; Ehrenberg, Hans-Juergen; and Eberhardt, Hans G., 4,976,306, Cl. 164-476.000.

Mannesmann Aktiengesellschaft: *See*—
Rohde, Johann H.; and Meurer, Hans, 4,976,127, Cl. 72-95.000.

Mannesmann Rexroth GmbH: *See*—
Hein, Theo, 4,976,332, Cl. 180-197.000.

Manning, Thomas O., to Thermo King Corporation. Air conditioning unit having an internal combustion engine which is suitable for mounting on the roof of a building. 4,976,114, Cl. 62-323.100.

Manson, Larry J.; and Goslee, Michael D., to Whirlpool Corporation. Diagnostic system for an automatic appliance. 4,977,394, Cl. 340-679.000.

Mar, Craig E.: *See*—
Machold, Timothy R.; Mar, Craig E.; Mueller, Richard L., Jr.; and Shanahan, John P., 4,976,720, Cl. 606-194.000.

Marchand, Sam R.: *See*—
Bays, F. Barry; Trott, Arthur F.; and Marchand, Sam R., 4,976,715, Cl. 606-77.000.

Marconi Company Limited, The: *See*—
Sharma, Rakesh; and Sosin, Boleslaw M., 4,977,617, Cl. 455-319.000.

Marcotte, Louis: *See*—
Bazin, Roland M.; Obadia, Gerard; Marcotte, Louis; and Scot, Jean, 4,976,272, Cl. 128-774.000.

Marcus, David: *See*—
Diman, Charles; Marcus, David; Mitchell, Philip; and Sachs, Baruch, 4,976,876, Cl. 210-791.000.

Marcus, Harris L.: *See*—
Blumenshine, Kent M.; Marcus, Harris L.; and Long-Daugherty, Kathleen A., 4,976,814, Cl. 156-277.000.

Maringer, Robert E.; Nack, Herman; and Razgaitis, Richard, to Battelle Development Corporation. Nested, recirculating-fiber filter. 4,976,934, Cl. 423-210.000.

Markley, Dean A.: *See*—
Felter, Richard E.; Markley, Dean A.; and Musser, Deborah L., 4,976,890, Cl. 252-511.000.

Markovac, Vlado: *See*—
Anderson, James E.; Markovac, Vlado; and Troyk, Philip R., 4,977,009, Cl. 429-76.000.

Marlin, Dave B.; and Marlin, Earl B., Jr. Body massage apparatus. 4,976,256, Cl. 128-64.000.

Marlin, Earl B., Jr.: *See*—
Marlin, Dave B.; and Marlin, Earl B., Jr., 4,976,256, Cl. 128-64.000.

Marquis, Edward T.; Keating, Kenneth P.; Meyer, Robert A.; and Sanderson, John R., to Texaco Chemical Company. Recovery of tertiary butyl hydroperoxide and tertiary butyl alcohol. 4,977,285, Cl. 549-529.000.

Marrelli, John D.: *See*—
Durrett, Michael G.; Helms, David A.; Hatton, Gregory J.; Dowty, Earl L.; Marrelli, John D.; Stafford, Joseph D.; and Stavish, David J., 4,977,377, Cl. 324-640.000.

Marrett, Rolf: *See*—
Oerlemans, Peter; Marrett, Rolf; Eckert, Armin; and Altfeld, Klaus, 4,976,845, Cl. 208-39.000.

Marsch, Hans-Dieter: *See*—
Foster, Friedrich; Brieke, Hans-Gunter; and Marsch, Hans-Dieter, 4,976,928, Cl. 422-148.000.

Marsh, Ivan M.: *See*—
McAuliffe, Donald C.; and Marsh, Ivan M., 4,976,790, Cl. 148-2.000.

Marshall, Andrew; Colman, Derek; Cavanagh, Philip J.; and Dale, David P., to Texas Instruments Incorporated. Semiconductor switch. 4,977,476, Cl. 361-18.000.

Martell, William A.; Weiss, Ladislaus; VanJaarsveld, Robert P.; and Brown, Colin R., to General Motors Corporation. Plastic tooling with compression adjustment. 4,976,400, Cl. 249-134.000.

Martella, David J.; and Jaruzelski, John J., to Exxon Chemical Patents, Inc. Alkyl phenol-sulfur condensates as fuel and lubricating oil additives. 4,976,882, Cl. 252-48.200.

Martin, Christoph: *See*—
Meyer, Joachim; Buehler, Wolfgang; Grimmer, Johannes; Eipper, Gunter; Kiefer, Hans; and Martin, Christoph, 4,977,190, Cl. 514-951.000.

Martin Electronics, Inc.: *See*—
Hamilton, James E., 4,976,201, Cl. 102-323.000.

Martin, James. Apparatus for controlling the supplying of intravenous fluids. 4,976,687, Cl. 604-65.000.

Martin, Jean-Claude: *See*—
Porcher, Alain R.; and Martin, Jean-Claude, 4,976,925, Cl. 422-100.000.

Martin, Jean-Marc: *See*—
Paliard, Maurice; Martin, Jean-Marc; Cochet, Francis; and Valdelievre, Benoit, 4,976,469, Cl. 241-24.000.

Martin & Pagenstecher GmbH: *See*—
Klein, Walter; and Wolf, Irmelin, 4,977,115, Cl. 501-107.000.

Martin, Robert J.; and Lane, Barry L., to Actran Systems, Inc. Electronically tuned electro-acoustic power oscillator. 4,977,380, Cl. 331-74.000.

Martine, Robert; and Henigue, Christian, to ECIA - Equipments et Composants pour l'Industrie Automobile. Process for manufacturing a steering wheel for a motor vehicle. 4,976,801, Cl. 156-245.000.

Martineu, Pierre; Saunier, Christiane; Rousset, Jacky; and Jacquemet, Christian, to Coatex S.A.; and Conservatome S.A. Polymer composition charged with powdered mineral material with a high capacity of water absorption. 4,977,192, Cl. 521-56.000.

Martiny, Ingo A., to U.S. Philips Corporation. Schmitt-trigger circuit having no discrete resistor. 4,977,336, Cl. 307-290.000.

Maru, Tsuguo, to NEC Corporation. Portable radio apparatus having battery saved channel scanning function. 4,977,611, Cl. 455-161.000.

Maruani, Alain: *See*—
Sirat, Gabriel; Dufresne, Eric; Charlot, Didier; and Maruani, Alain, 4,976,504, Cl. 350-373.000.

Maruyama, Yutaka; and Komoriya, Haruhiko, to Central Glass Company, Limited. Aromatic polyamide from 2,2'-bis(4-(4-amino-phenoxy)phenyl)hexafluoro propane. 4,977,232, Cl. 528-185.000.

Marzocco, Alessandro, to Luigi Franchi S.p.A. Device for extracting cartridge cases from the cartridge chambers of so-called swing-barrel shotguns. 4,976,059, Cl. 42-46.000.

Massachusetts Institute of Technology: *See*—
Flytzani-Stephanopoulos, Maria; and Jothimurugesan, Kandaswami, 4,977,123, Cl. 502-84.000.

Massey, Navarre A. Mechanical jacking device. 4,976,413, Cl. 254-95.000.

Masuda, Satoshi; Shigemitsu, Fumiaki; and Usuda, Kinya, to Kabushiki Kaisha Toshiba. Method of forming pattern and apparatus for implementing the same. 4,976,810, Cl. 156-659.100.

Masukawa, Toyoaki: *See*—
Ishige, Osamu; Masukawa, Toyoaki; Kida, Shuji; and Hirabayashi, Shigeto, 4,977,073, Cl. 430-549.000.

Masumoto, Iwao: *See*—
Hirata, Akira; and Masumoto, Iwao, 4,976,462, Cl. 236-345.000.

Matejec, Reinhart: *See*—
Renner, Gunter; and Matejec, Reinhart, 4,977,072, Cl. 430-549.000.

Mathes, Bernhard; Gosing, Guenter; and Oberfrank, Martin, to General Motors Corporation. Fastening element. 4,976,578, Cl. 411-512.000.

Mathias, Lon J.: *See*—
Culberson, Doris A.; and Mathias, Lon J., 4,977,229, Cl. 528-26.000.

Mathieu, Yves: *See*—
Bonnet, Thierry; and Mathieu, Yves, 4,977,518, Cl. 364-521.000.

Matkovich, Vlado I., to Pall Corporation. Vacuum diagnostic device. 4,976,926, Cl. 422-101.000.

Matoba, Keiko: *See*—
Kosaka, Genji; and Matoba, Keiko, 4,977,306, Cl. 392-380.000.

Matson, Wayne R., to ESA, Inc. Method for modifying diffusion selectivity of porous fritted carbonaceous electrode. 4,976,994, Cl. 427-230.000.

Matsuda, Hidemi: *See*—
Itou, Takeo; and Matsuda, Hidemi, 4,977,347, Cl. 313-478.000.
Matsuda, Yoshio; Fujishima, Kazuyasu; Ooishi, Tsukasa; Arimoto, Kazutami; and Tsukude, Masaki, to Mitsubishi Denki Kabushiki Kaisha. Dynamic semiconductor memory device of a twisted bit line system having improved reliability of readout. 4,977,542, Cl. 365-207.000.
Matsuhisa, Akira: *See*—
Ohta, Mitsuaki; Koide, Tokuo; Suzuki, Takeshi; Matsuhisa, Akira; Yanagisawa, Isao; and Miyata, Keiji, 4,977,175, Cl. 514-394.000.
Matsuhisa, Tadaaki; and Iwasaki, Hiroyuki, to NGK Insulators, Ltd. Shaping molds and shaping of ceramic bodies by using such shaping molds. 4,976,903, Cl. 264-86.000.
Matsui, Keizo: *See*—
Higuchi, Noboru; Kobayashi, Chuzo; Ichikawa, Yasunori; Matsui, Keizo; and Yamaguchi, Shigeru, 4,976,377, Cl. 222-55.000.
Matsui, Minoru, to NGK Insulators, Ltd. Silicon nitride sintered body and a method of producing the same. 4,977,112, Cl. 501-97.000.
Matsuki, Noborn: *See*—
Tani, Toshio; Kamiyama, Osamu; Matsuki, Noborn; Fukuda, Ryosaku; Akutsu, Tsukasa; and Nakatsugawa, Hiroshi, 4,976,826, Cl. 204-12.000.
Matsumaru, Takafumi: *See*—
Suzumori, Koichi; Matsumaru, Takafumi; and Iikura, Shoichi, 4,976,191, Cl. 92-48.000.
Matsumi, Kuninori: *See*—
Shiomi, Makoto; Ohsawa, Michitaka; Sakamoto, Toshiyuki; Matsumi, Kuninori; Ozeki, Kosuke; Yuki, Ikuo; and Sato, Kenji, 4,977,446, Cl. 358-60.000.
Matsumoto Design Company Limited: *See*—
Matsumoto, Takashi, 4,976,385, Cl. 224-42.420.
Matsumoto, Hajime: *See*—
Hirakawa, Nobuhiko; Kashiwaba, Noriaki; Matsumoto, Hajime; Hosoda, Akihiko; Sekine, Yasuo; Isowa, Yoshikazu; Yamura, Tetsuaki; Sekine, Akihiro; and Nishikawa, Masashi, 4,977,267, Cl. 546-272.000.
Matsumoto, Hiroyasu, to Tagawa Kikai Co., Ltd. Weft end tensioning and detecting devices for shuttleless loom. 4,976,292, Cl. 139-194.000.
Matsumoto, Isao: *See*—
Kadouchi, Eiji; Matsumoto, Isao; Fujii, Takabumi; Sato, Hiroshi; and Hino, Takashi, 4,977,043, Cl. 429-54.000.
Matsumoto, Renpei, to Fuji Jukogyo Kabushiki Kaisha. Vehicle traction control system for preventing vehicle turnover on curves and turns. 4,976,330, Cl. 180-197.000.
Matsumoto, Saichi; Doteuchi, Masami; Mizui, Takuji; and Hirai, Kentaro, to Shionogi & Co., Ltd. Isoprenoidamine compounds which are useful antiulcer agents. 4,977,170, Cl. 514-352.000.
Matsumoto, Takahiro: *See*—
Maehara, Naoyoshi; Bessyo, Daisuke; Matsumoto, Takahiro; and Kusunoki, Shigeru, 4,977,301, Cl. 219-10.55B.
Matsumoto, Takashi, to Matsumoto Design Company Limited. Holder for tubular container. 4,976,385, Cl. 224-42.420.
Matsumoto, Yuto; Yamaga, Hiroyoshi; Akuzawa, Noboru; and Obara, Toshio, to Hodogaya Chemical Co., Ltd. Metal of hydroxyphenylaze and hydroxy-naphthylazo compounds as near-red absorbers. 4,977,249, Cl. 534-696.000.
Matsumura, Hiromu; Yano, Toshisada; Matsushita, Akira; and Eigyo, Masami, to Shionogi & Co., Ltd. Carbamoylpyrolidone derivatives and drugs for senile dementia. 4,977,167, Cl. 514-326.000.
Matsumura, Takeshi; and Koizumi, Noboru, to Fuji Photo Optical Co., Ltd. Projection lens system for projectors. 4,976,525, Cl. 350-432.000.
Matsuo, Shigeru; Murakami, Tomoyoshi; Bando, Thoru; and Nagatoshi, Kikuo, to Idemitsu Kosan Company Limited. Polycyanoaryl ether composition method for preparing the same and uses thereof. 4,977,234, Cl. 528-211.000.
Matsuoka, Hideyuki: *See*—
Yoshimura, Toshiyuki; Takeda, Eiji; Matsuoka, Hideyuki; and Igura, Yasuo, 4,977,435, Cl. 357-23.500.
Matsuoka, Hirofumi; and Tabuse, Hidetoshi, to Koyo Seiko Co., Ltd. Motor-driven power steering control apparatus. 4,977,507, Cl. 364-424.050.
Matsuoka, Hiroki: *See*—
Sonoda, Yukihiro; Osawa, Kouichi; Kanai, Hiroshi; Hoshi, Kouichi; Matsuoka, Hiroki; Ohashi, Michihiro; and Sawada, Hiroshi, 4,976,242, Cl. 123-489.000.
Matsuoka, Masayoshi: *See*—
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; and Mikami, Nakao, 4,976,705, Cl. 604-304.000.
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; Tachibana, Hideki; and Tanase, Setsumi, 4,976,706, Cl. 604-304.000.
Matsushita, Akira: *See*—
Matsumura, Hiromu; Yano, Toshisada; Matsushita, Akira; and Eigyo, Masami, 4,977,167, Cl. 514-326.000.
Matsushita Electric Industrial Co., Ltd.: *See*—
Fujiyama, Terumi, 4,977,298, Cl. 200-5.00A.
Hashimoto, Kazuhiko; Koizumi, Taichi; Kawakita, Kenji; and Nomura, Noboru, 4,976,818, Cl. 156-643.000.
Kadouchi, Eiji; Matsumoto, Isao; Fujii, Takabumi; Sato, Hiroshi; and Hino, Takashi, 4,977,043, Cl. 429-54.000.
Maehara, Naoyoshi; Bessyo, Daisuke; Matsumoto, Takahiro; and Kusunoki, Shigeru, 4,977,301, Cl. 219-10.55B.
Murata, Kazuyuki; Kanno, Kinya; and Kanamori, Katsuhiro, 4,977,448, Cl. 358-75.000.
Sano, Yoshikazu, 4,977,420, Cl. 354-79.000.
Sawada, Kazuyuki; Ogawa, Hisashi; Yano, Kohsaku; and Fujita, Tsutomu, 4,977,104, Cl. 437-162.000.
Matsushita Electric Works, Ltd.: *See*—
Tsukamoto, Katsuya; and Abiko, Toshio, 4,977,406, Cl. 343-700.0MS.
Matsushita Electrical Indust. Co.: *See*—
Kondo, Shigeo; and Sotomura, Tadashi, 4,977,007, Cl. 428-76.000.
Matsutani, Kanji; Matsutani, Masamitsu; Otsuka, Tadashi; and Tochimura, Yoshimasa, to Matsutani Seisakusho Co., Ltd. Surgical needle. 4,976,727, Cl. 606-223.000.
Matsutani, Masamitsu: *See*—
Matsutani, Kanji; Matsutani, Masamitsu; Otsuka, Tadashi; and Tochimura, Yoshimasa, 4,976,727, Cl. 606-223.000.
Matsutani Seisakusho Co., Ltd.: *See*—
Matsutani, Kanji; Matsutani, Masamitsu; Otsuka, Tadashi; and Tochimura, Yoshimasa, 4,976,727, Cl. 606-223.000.
Matsuura, Kosei: *See*—
Tashiro, Koichi; Ikezawa, Mamoru; Sano, Takashi; Matsuura, Kosei; and Nakatani, Hajime, 4,976,438, Cl. 273-313.000.
Maucksch, Thomas; Holzmann, Gottfried; and Korber, Frank, to Rohde & Schwarz GmbH & Co. Method of generating an RF signal modulated by a message signal and distorted by a predetermined fading profile for testing RF receivers, and apparatus for carrying out the method including a fading simulator. 4,977,607, Cl. 455-10.000.
Mauldin, Charles H.; and Riley, Kenneth L., to Exxon Research and Engineering Company. Process for the preparation of surface impregnated dispersed cobalt metal catalysts. 4,977,126, Cl. 502-242.000.
Maurer, Max: *See*—
Hausermann, Walter; Maurer, Max; and Friedel, Thomas, 4,977,169, Cl. 514-346.000.
Maurer, Paul-Gerhard: *See*—
Braehler, Georg; Ganser, Benno; and Maurer, Paul-Gerhard, 4,976,569, Cl. 405-59.000.
Mavljutov, Midkhat R.: *See*—
Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A., 4,976,322, Cl. 175-57.000.
Max Co., Ltd.: *See*—
Yamaguchi, Morio; Kudoh, Yasunori; and Nakazato, Takashi, 4,976,553, Cl. 400-124.000.
Max-Planck-Institut fur Eisenforschung GmbH: *See*—
Buchner, Achim R., 4,976,304, Cl. 164-428.000.
Max Schlatterer GmbH & Co. KG: *See*—
Schneider, Manfred, 4,977,017, Cl. 428-229.000.
Maxwell, Ian E.; and Biswass, Jaydeep, to Shell Oil Company. Process for the catalytic cracking of a hydrocarbon feedstock. 4,976,847, Cl. 208-120.000.
Maxwell, M. Craig: *See*—
Janik, Leon P.; and Maxwell, M. Craig, 4,976,852, Cl. 210-86.000.
Maybank, John: *See*—
McAndless, John M.; Hancock, James R.; Barnett, Donald B.; Olm, Orville J.; Locke, Terry J. A.; and Maybank, John, 4,976,924, Cl. 422-99.000.
Mazda Motor Corporation: *See*—
Fujita, Makoto, 4,976,917, Cl. 419-33.000.
Hashimoto, Teruo; Fukushima, Yoshio; Suzuki, Toshifumi; and Minamoto, Hiroshi, 4,976,491, Cl. 296-192.000.
Ohmura, Hiroshi, 4,976,328, Cl. 180-140.000.
McAllan, John D.; and Young, Douglas L. Navigation aid. 4,976,039, Cl. 33-285.000.
McAndless, John M.; Hancock, James R.; Barnett, Donald B.; Olm, Orville J.; Locke, Terry J. A.; and Maybank, John, to Her Majesty the Queen in Right of Canada, as represented by the Minister of National Defence. Automated thermal desorption unit. 4,976,924, Cl. 422-99.000.
McAuliffe, Donald C.; and Marsh, Ivan M., to Golden Aluminum Company. Process for preparing low earing aluminum alloy strip. 4,976,790, Cl. 148-2.000.
McCambridge, John M., to Chrysler Corporation. Improper bit combination detection circuit. 4,977,559, Cl. 371-57.100.
McCartney, Ronald N.: *See*—
Jeffcott, Leo B.; and McCartney, Ronald N., 4,976,267, Cl. 128-660.010.
McClelland, Gregory A.; Zentner, Gaylen M.; and Pogany, Stefano A., to Merck & Co., Inc. Resin modulated drug delivery device for the delivery of HMG-CoA reductase inhibitor salts. 4,976,967, Cl. 424-473.000.
McClure, Dana W., to GTE Cellular Communications Corporation. Interface circuit for telecommunications devices. 4,977,609, Cl. 455-89.000.
McConnell, Bain C.; Jarvis, William R.; Demey, C. Fred, III; and Maddrey, James G., Jr., to R. J. Reynolds Tobacco Company. Weighing system. 4,976,326, Cl. 177-145.000.
McConnell, Ronald F., to E. I Du Pont de Nemours and Company. Method of forming a web. 4,976,012, Cl. 19-299.000.
McConnell, Ronald F.; and Popper, Peter, to Du Pont de Nemours, E. I., and Company. In-line consolidation of braided structures. 4,976,812, Cl. 156-148.000.
McCormick, William S.: *See*—
Tsui, James B. Y.; and McCormick, William S., 4,977,365, Cl. 324-78.00R.
McCullough, Ross M. Motion translating device. 4,976,189, Cl. 91-476.000.
McDonnell Douglas Corporation: *See*—
Udd, Eric, 4,976,507, Cl. 350-96.180.

McGahren, William J.; and Ellestad, George A., to American Cyanamid Company. Antibacterial and antitumor agents LL-E33288EPSILON-I and LL-E33288EPSILON-BR. 4,977,143, Cl. 514-25.000.

McGaughey, Harry S., III; Melkus, Lovie A.; and Torres, Robert J., to International Business Machines Corporation. Method to facilitate a reply to electronic meeting invitation in an interactive multi-terminal system employing electronic calendars. 4,977,520, Cl. 364-521.000.

McHugh, Carl M.: *See*—
Williamson, Robert E.; McHugh, Carl M.; and Hood, Clarence E., 4,976,094, Cl. 56-330.000.

McKee, Kathryn S.: *See*—
Nichols, Buford L.; and McKee, Kathryn S., 4,977,137, Cl. 514-6.000.

McKee, Peter G., to Saturn Corporation. Method of installing and sizing a bushing in a shaft. 4,976,023, Cl. 29-523.000.

McKinley, Kerry; and Twombly, Benjamin, to Perkin Elmer Corporation, The. 3 point bending measuring system. 4,976,152, Cl. 73-852.000.

McLaughlin Manufacturing Company, Inc.: *See*—
Van Meter, Brad, 4,976,321, Cl. 175-24.000.

McLean, Francis A.: *See*—
Lee, Leonard G.; and McLean, Francis A., 4,976,046, Cl. 33-640.000.

McLees, Donald J. Moisture disabled needle. 4,976,704, Cl. 604-265.000.

McLellan, Michael F.; and Abhari, Reza S., to Cyclone Products Corporation. Bicycle cover. 4,976,389, Cl. 224-328.000.

McMillan, Kenneth: *See*—
Simon, Jaime; Garlich, Joseph R.; Wilson, David A.; and McMillan, Kenneth, 4,976,950, Cl. 424-1.100.

McNeil (Ohio) Corporation: *See*—
Grach, Ayzik, 4,976,192, Cl. 92-165.00R.

McNicol, John D., to Northern Telecom Limited. Timing and carrier recovery in TDMA without preamble sequence. 4,977,580, Cl. 375-97.000.

McPhail, Andrew T.; Spielvogel, Bernard F.; and Hall, Iris H., to Duke University. Boron dipeptide compounds. 4,977,268, Cl. 548-110.000.

McQueen, Malcolm M. Distributed RTD. 4,977,385, Cl. 338-24.000.

McVay, Ted M.; and Baxter, Gene F., to Georgia-Pacific Corporation. Phenolic resin containing a latent hardening agent comprising the carbamate reaction product of a cyclic. 4,977,231, Cl. 528-142.000.

Mead Corporation, The: *See*—
Crutchfield, E. Bryant, 4,976,355, Cl. 206-457.000.
Gottschalk, Peter; Neckers, Douglas C.; Schuster, Gary B.; Adair, Paul C.; and Pappas, S. Peter, 4,977,511, Cl. 364-473.000.
Liang, Rong-Chang; Simpson, William H.; Gyure, Katherine A.; and Carpenter, Kenneth P., 4,977,059, Cl. 430-138.000.
Liang, Rong-Chang; Hipps, Jesse, Sr.; and Chen, Jing-Den, 4,977,060, Cl. 430-138.000.
Sutera, Richard, 4,976,993, Cl. 427-161.000.

Means, G. Robb: *See*—
Roberts, Mason R.; and Means, G. Robb, 4,976,112, Cl. 62-48.100.

Meddiss, Incorporated: *See*—
Miyamoto, Alfonso T., 4,976,593, Cl. 417-476.000.

Medtronic Versaflex, Inc.: *See*—
Buchbinder, Maurice; and Solar, Ronald J., 4,976,689, Cl. 604-95.000.

Meguro, Tatsuya: *See*—
Tsuchida, Tetsuo; Meguro, Tatsuya; Seyama, Fumio; and Kondo, Mitsuru, 4,977,132, Cl. 503-220.000.

Mehl, Donald N., to Creative Research & Manufacturing. Tissue needle. 4,976,269, Cl. 128-754.000.

Mehrotra, Vikram P.: *See*—
Schricker, Brian R.; and Mehrotra, Vikram P., 4,976,963, Cl. 424-438.000.

Meiji Milk Products Co., Ltd.: *See*—
Suginaka, Yutaka; and Taniguchi, Shigeru, 4,976,678, Cl. 494-68.000.

Meisterling, Jesse R.: *See*—
Snyder, Robert F.; Ferguson, John H.; Meisterling, Jesse R.; and Fishman, David S., 4,976,159, Cl. 73-862.210.

Meline, Ralph E. Elk call. 4,976,648, Cl. 446-207.000.

Melkus, Lovie A.: *See*—
McGaughey, Harry S., III; Melkus, Lovie A.; and Torres, Robert J., 4,977,520, Cl. 364-521.000.

Melzer, Jaroslav: *See*—
Benninghoff, Norbert; Jaensch, Manfred; Melzer, Jaroslav; Niesar, Gunter; and Schuster, Werner, 4,976,138, Cl. 73-73.000.
De Clercq, Arnold; Bergold, Wolfram; Degen, Hans-Juergen; and Melzer, Jaroslav, 4,976,888, Cl. 252-358.000.

Memovich, Gary H.: *See*—
Batchelder, Tom W.; Sautter, Kenneth M.; and Memovich, Gary H., 4,977,330, Cl. 250-560.000.

Menchetti, Robert J., to National Gypsum Company. Panels with laminated strips for clips. 4,976,083, Cl. 52-489.000.

Mendoza-Mendoza, Andres: *See*—
Perez-Ruiz, Jose-Maria; and Mendoza-Mendoza, Andres, 4,977,299, Cl. 200-5.00B.

Menezes, Edgar: *See*—
Dorband, Glen C.; Liland, Alfred; Menezes, Edgar; Steinheuser, Peter; Popadiuk, Nicholas M.; and Failla, Stephen J., 4,976,909, Cl. 264-235.000.

Menin, Jacques: *See*—
Sevrin, Mireille; George, Pascal; Menin, Jacques; Morel, Claude; and Bigg, Dennis, 4,977,159, Cl. 514-292.000.

Mensing, Hermann; Sternitzke, Reinhard; Waldeck, Karl; and Schnabel, Klaus, to BHS-Bayerische Berg-, Hutten- und Salzwerke Aktiengesellschaft. Longitudinal slitting and/or grooving machine for transported material sheets, particularly for sheets of corrugated board. 4,976,676, Cl. 493-365.000.

Mercer, Robert L.: *See*—
Bahl, Lalit R.; DeSouza, Peter V.; Mercer, Robert L.; and Picheny, Michael A., 4,977,599, Cl. 381-43.000.

Merck & Co., Inc.: *See*—
Biftu, Tesfaye; Ponpipom, Mitree M.; and Girotra, Nirindar N., 4,977,146, Cl. 514-99.000.
McClelland, Gregory A.; Zentner, Gaylen M.; and Pogany, Stefano A., 4,976,967, Cl. 424-473.000.

Merck, Sharp & Dohme Ltd.: *See*—
Houghton, Peter G.; and Wright, Stanley H. B., 4,977,258, Cl. 540-548.000.

Meredith, Paul T.: *See*—
Carlson, Robert B.; Cosgrove, Barbara J.; and Meredith, Paul T., 4,976,396, Cl. 244-55.000.

Merigaud, Bernard; Claus, Michel; and Passerieux, Robert, to Degussa Aktiengesellschaft. Browning utensil for microwave ovens. 4,977,302, Cl. 219-10.55E.

Merrell Dow Pharmaceuticals: *See*—
Parker, Roger A.; and Sunkara, Sai P., 4,977,185, Cl. 514-473.000.

Merritt, Carleton G.: *See*—
Gilmore, Stephen R.; and Merritt, Carleton G., 4,976,982, Cl. 426-557.000.

Messerschmitt-Bolkow-Blohm GmbH: *See*—
Bohn, Gerhard, 4,976,454, Cl. 280-707.000.

Messier-Hispano-Bugatti: *See*—
Guichard, Jean; and Favre, Christian, 4,976,499, Cl. 303-13.000.

Meurer, Hans: *See*—
Rohde, Johann H.; and Meurer, Hans, 4,976,127, Cl. 72-95.000.

Meyer, James H.; Amidon, Gordon L.; and Dressman, Jennifer B., to University of Michigan, The. Controlled release dosage form. 4,976,949, Cl. 424-1.100.

Meyer, Joachim; Buehler, Wolfgang; Grimmer, Johannes; Eipper, Gunter; Kiefer, Hans; and Martin, Christoph, to BASF Aktiengesellschaft. Preparation of riboflavin, produced by a microbial method, in the form of spray-dried granules or microgranules. 4,977,190, Cl. 514-951.000.

Meyer, Robert A.: *See*—
Marquis, Edward T.; Keating, Kenneth P.; Meyer, Robert A.; and Sanderson, John R., 4,977,285, Cl. 549-529.000.

Meyer, Urs; and Lattion, Andre, to Rieter Machine Works, Ltd. Method and apparatus for dissipating heat from a textile machine. 4,976,098, Cl. 57-308.000.

Meyerle, Michael. Continuous speed-change branched gear, in particular for motor vehicles. 4,976,666, Cl. 475-83.000.

Meyers, Peter V.; Liu, Chung-Heng; and Frey, Timothy J., to Ametek, Inc. Method of making heterojunction P-I-N photovoltaic cell. 4,977,097, Cl. 437-4.000.

Mezzedimi, Vasco; and Frosini, Franco, to Nuovopignone-Industrie Meccaniche e Fonderia S.p.A. System for the rapid balancing of revolving shafts, particularly suitable for gas turbines. 4,976,585, Cl. 415-118.000.

Michael's France: *See*—
Aghion, Michael, 4,976,714, Cl. 606-62.000.

Michel, Jean P.: *See*—
Landanger, Joel; and Michel, Jean P., 4,976,713, Cl. 606-62.000.

Micrion Corporation: *See*—
Ward, Billy W.; Edwards, David, Jr.; and Casella, Robert A., 4,976,843, Cl. 204-298.360.

Midkiff, John A.: *See*—
Davila, Dan I.; Midkiff, John A.; and Ekanayake, Dulip, 4,976,510, Cl. 350-96.200.

Miege, Christian; Monteil, Pierre; and Obrecht, Gerard, to Essilor International, Cie Generale d'Optique. Simultaneous vision optical lens for correcting presbyopia. 4,976,534, Cl. 351-161.000.

Migliori, Albert; Visscher, William M.; and Fisk, Zachary, to United States of America, Energy. Resonant ultrasound spectrometer. 4,976,148, Cl. 73-579.000.

Mikami, Nakao: *See*—
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; and Mikami, Nakao, 4,976,705, Cl. 604-304.000.

Mikami, Takeshi, to Fuji Photo Film Co., Ltd. Electro-statographic toner material. 4,977,052, Cl. 430-98.000.

Mikhail, Amir: *See*—
Johnston, J. Ford; Farone, William A.; and Mikhail, Amir, 4,976,587, Cl. 416-230.000.

Mikoshiba, Atsushi: *See*—
Kohno, Akiyoshi; and Mikoshiba, Atsushi, 4,977,584, Cl. 377-58.000.

Milbrath, Dean S., to Minnesota Mining and Manufacturing Co. Chemiluminescent methods and a kit therefor involving a beta-lactam. 4,977,080, Cl. 435-28.000.

Miley, John W.; and Rekers, John W., to Milliken Research Corporation. Polyoxyalkylene amino alcohols and polyoxyalkylene amino 1,3-dioxanes and 1,3-dioxolanes. 4,977,281, Cl. 549-373.000.

Miller, Benson L.; Scherer, Paul T.; and Maclin, Neiman C., to Millex, Inc. Door mounted ironing board assembly. 4,976,205, Cl. 108-47.000.

Miller, Bruce E.: *See*—
Bowen, Mark S.; Fantone, Stephen D.; Miller, Bruce E.; and Thompson, Duane T., 4,977,325, Cl. 250-461.200.

Miller, James R.: *See*—
Kovacevic, Steven; Miller, James R.; Veal, Loraine E.; and Wood, John S., 4,977,089, Cl. 435-252.310.

Miller, Ron. Telescopic hedge trimming apparatus. 4,976,031, Cl. 30-296.100.

Millex, Inc.: *See*—
Miller, Benson L.; Scherer, Paul T.; and Maclin, Neiman C., 4,976,205, Cl. 108-47.000.

Milliken Research Corporation: *See*—
Miley, John W.; and Rekers, John W., 4,977,281, Cl. 549-373.000.

Mills, Lester; and Previdoli, Felix, to Lonza Ltd. Process for the production of 4,5-dichloro-6-ethylpyrimidine. 4,977,264, Cl. 544-334.000.

Milovancevic, Slavko, to Executone Information Systems, Inc. Signal level expansion apparatus as for a telecommunications system. 4,977,590, Cl. 379-395.000.

Minami, Akira; and Tanaka, Shigeyoshi, to Fujitsu Limited. Optical disk tracking control system and method having normalized tracking error control signal. 4,977,551, Cl. 369-44.250.

Minami, Norio: *See*—
Oinuma, Hitoshi; Yamanaka, Motosuke; Miyake, Kazutoshi; Hoshiko, Tomonori; Minami, Norio; and Shoji, Tadao, 4,977,165, Cl. 514-318.000.

Minamoto, Hiroshi: *See*—
Hashimoto, Teruo; Fukushima, Yoshio; Suzuki, Toshifumi; and Minamoto, Hiroshi, 4,976,491, Cl. 296-192.000.

Minitronics Pty Limited: *See*—
Helal, Mohammed A.; and Puckeridge, Larry, 4,977,353, Cl. 315-130.000.

Minnesota Mining and Manufacturing Company: *See*—
Brown, Robert C.; and Lu, Shih-Lai, 4,977,003, Cl. 428-35.500.
Jongewaard, Susan K.; Smith, Terrance P.; Leichter, Louis M.; and Zaklika, Krzysztof A., 4,977,134, Cl. 503-227.000.
Milbrath, Dean S., 4,977,080, Cl. 435-28.000.
Norbury, Robert J.; and Chang, Robert W. H., 4,976,961, Cl. 424-401.000.
Winslow, John M., 4,977,070, Cl. 430-510.000.

Minohara, Taketoshi: *See*—
Ito, Hiroshi; Handa, Junichi; Takagi, Yoshio; and Minohara, Taketoshi, 4,976,787, Cl. 106-441.000.

Minolta Camera Kabushiki Kaisha: *See*—
Mukai, Hiromu; Karasaki, Toshihiko; and Hayashi, Kohtaro, 4,977,424, Cl. 354-410.000.
Tsuji, Kenji; Izumi, Shuji; Nakai, Masaaki; and Taniguchi, Nobuyuki, 4,977,423, Cl. 354-402.000.

Minowa, Yoshibumi: *See*—
Nakatani, Hajime; Minowa, Yoshibumi; and Wakata, Hitoshi, 4,977,563, Cl. 372-32.000.

Minowa, Yoshio: *See*—
Shirakawa, Yoichi; Minowa, Yoshio; Azumi, Takayoshi; and Hisano, Junichi, 4,976,973, Cl. 426-7.000.

Minton, Mary L., to Potlatch Corporation. Pulp treatment methods. 4,976,819, Cl. 162-9.000.

Miranti, Joseph P., Jr., to Dayco Products, Inc. Endless power transmission belt construction and method of making the same. 4,976,662, Cl. 474-205.000.

Mirota, Hideaki: *See*—
Kudo, Shigeji; Suzuki Sanae; Mirota, Hideaki; and Suzuki, Hiroo, 4,976,294, Cl. 140-102.000.

Mish, Joseph E.; and Petersheim, Enos. Post level apparatus. 4,976,040, Cl. 33-372.000.

Mishina, Kazuya: *See*—
Rikimaru, Hiroaki; Nakatsuji, Tadao; Umaba, Toshikatsu; Nagano, Kazuhiko; Mishina, Kazuya; and Shimizu, Hiromitsu, 4,977,127, Cl. 502-309.000.

Misiura, Anthony R., Sr.: *See*—
Misiura, Theresa R.; and Misiura, Anthony R., Sr., 4,975,997, Cl. 5-505.000.

Misiura, Theresa R.; and Misiura, Anthony R., Sr. Bedclothes supporting device. 4,975,997, Cl. 5-505.000.

Mita Industrial Co., Ltd.: *See*—
Fuji, Kazuo, 4,977,431, Cl. 355-289.000.

Mitchell, Allan T.: *See*—
Esquivel, Agerico L.; and Mitchell, Allan T., 4,977,439, Cl. 357-49.000.

Mitchell, Neil F.; and Djiauw, Lie K., to Shell Oil Company. Thermoplastic block copolymer films. 4,977,014, Cl. 428-220.000.

Mitchell, Philip: *See*—
Diman, Charles; Marcus, David; Mitchell, Philip; and Sachs, Baruch, 4,976,876, Cl. 210-791.000.

Mitchell, Scott W.: *See*—
Podell, Allen F.; Mitchell, Scott W.; Moghe, Sanjay B.; and Ali, Fazal, 4,977,382, Cl. 333-164.000.

Mitel Corporation: *See*—
Cline, John; and Gentile, Ken, 4,977,530, Cl. 364-579.000.

Mitsubishi Chemical Industries Limited: *See*—
Nozawa, Seiichi; Utsumi, Shigeo; and Nakata, Michio, 4,977,230, Cl. 528-125.000.

Mitsubishi Denki Kabushiki Kaisha: *See*—
Anami, Kenji; and Ichinose, Katsuki, 4,977,538, Cl. 365-230.030.
Hara, Mitsuhiko; Takizawa, Shozo; Tanaka, Tadao; Taniguchi, Yasutaka; Wada, Shunichi; and Ohtagaki, Shigeki, 4,977,506, Cl. 364-424.050.
Matsuda, Yoshio; Fujishima, Kazuyasu; Ooishi, Tsukasa; Arimoto, Kazutami; and Tsukude, Masaki, 4,977,542, Cl. 365-207.000.
Nakatani, Hajime; Minowa, Yoshibumi; and Wakata, Hitoshi, 4,977,563, Cl. 372-32.000.
Ogata, Teruaki; and Sudou, Yuko, 4,977,531, Cl. 364-580.000.
Ohbayashi, Shigeki; and Asahina, Katsushi, 4,977,337, Cl. 307-446.000.
Okamoto, Tatsuo; Kotani, Hideo; Oono, Takio; Watabe, Kiyoto; Kinoshita, Yasushi; and Nishikawa, Yoshikazu, 4,977,105, Cl. 437-190.000.
Okuda, Hiroshi, 4,976,234, Cl. 123-198.0DC.
Okuda, Hiroshi, 4,976,240, Cl. 123-406.000.
Sakamura, Ken; Shimizu, Toru; Iwata, Shunichi; and Enomoto, Tatsuya, 4,977,497, Cl. 364-200.000.
Shimura, Teruyuki, 4,977,100, Cl. 437-44.000.
Takada, Nobuharu; and Hirosaki, Toshihiko, 4,977,363, Cl. 318-771.000.

Mitsubishi Jidosha Kogyo Kabushiki Kaisha: *See*—
Hara, Mitsuhiko; Takizawa, Shozo; Tanaka, Tadao; Taniguchi, Yasutaka; Wada, Shunichi; and Ohtagaki, Shigeki, 4,977,506, Cl. 364-424.050.
Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, 4,976,241, Cl. 123-425.000.

Mitsubishi Jukogyo Kabushiki Kaisha: *See*—
Irie, Nobuhiko; and Agawa, Jiro, 4,976,807, Cl. 156-405.100.
Rikimaru, Hiroaki; Nakatsuji, Tadao; Umaba, Toshikatsu; Nagano, Kazuhiko; Mishina, Kazuya; and Shimizu, Hiromitsu, 4,977,127, Cl. 502-309.000.

Mitsubishi Kasei Corporation: *See*—
Fujimori, Shinichiro; Yamazaki, Satoshi; Sugano, Mamoru; Kawamura, Makoto; Ninomiya, Kunihiro; Tobe, Akihiro; and Nitta, Issei, 4,977,151, Cl. 514-225.500.
Itagaki, Takaharu; Okada, Hiroyoshi; Miyake, Masao; Kobayashi, Takaaki; Tosa, Takahumi; and Satou, Hiroyuki, 4,976,976, Cl. 426-69.000.
Kanamaru, Shinichi; Yoshimura, Shushichi; Hisashi, Hideyuki; and Sakaue, Akinori, 4,976,945, Cl. 423-450.000.

Mitsubishi Oil Co., Ltd.: *See*—
Yano, Hisashi; Yabumoto, Junsuke; and Kuwavara, Ryuzi, 4,976,854, Cl. 210-168.000.

Mitsubishi Pertochemical Co., Ltd.: *See*—
Doi, Shuhei; and Ohnishi, Shunichi, 4,977,211, Cl. 525-54.310.

Mitsubishi Plastics Industries Limited: *See*—
Umemori, Noboru; Kouda, Osamu; and Horii, Yukio, 4,976,289, Cl. 138-122.000.

Mitsubishi Rayon Company Limited: *See*—
Sasaki, Isao; Mukai, Nobuhiro; and Ige, Hitoshi, 4,977,197, Cl. 522-14.000.
Sugimori, Teruhiko; Suzuki, Fumio; Habara, Hideaki; and Inada, Hiromasa, 4,977,241, Cl. 528-497.000.

Mitsuboshi Belting Ltd.: *See*—
Takano, Hiroshi, 4,976,657, Cl. 474-13.000.

Mitsui-Cyanamid, Ltd.: *See*—
Hosoya, Yoshio; Watanabe, Naotaka; Takagi, Isao; and Miyoshi, Atsuo, 4,977,208, Cl. 524-515.000.

Mitsui Kinzoku Kogyo Kabushiki Kaisha: *See*—
Ishikawa, Eizo, 4,977,012, Cl. 428-209.000.

Mitsui Toatsu Chemicals, Incorporated: *See*—
Sukawa, Hiroshi; Hirose, Sumio; Takahara, Shigeru; and Sasakawa, Tomoyoshi, 4,977,064, Cl. 430-270.000.

Miura, Tadashi: *See*—
Sakurada, Satoshi; Tagaya, Nobuaki; Miura, Tadashi; Maeshima, Tsugio; and Hashimoto, Takao, 4,977,120, Cl. 502-64.000.

Miyabayeshi, Nobuyoshi; Hosono, Masami; and Abe, Atsushi, to JEOL Ltd. Method for operating an FFT processor. 4,977,533, Cl. 364-726.000.

Miyagawa, Ichirou: *See*—
Horikawa, Kazuo; Okada, Kouichi; and Miyagawa, Ichirou, 4,976,527, Cl. 350-588.000.

Miyagawa, Masashi; Takenouchi, Masanori; and Ohkuma, Norio, to Canon Kabushiki Kaisha. Recording medium comprising a recording layer changing its transferability when provided with light and heat. 4,977,058, Cl. 430-138.000.

Miyakawa, Yoshitaka: *See*—
Horiuchi, Makoto; Shimizu, Atsushi; Miyakawa, Yoshitaka; and Sakurai, Kazuya, 4,976,105, Cl. 60-413.000.

Miyake, Kazutoshi: *See*—
Oinuma, Hitoshi; Yamanaka, Motosuke; Miyake, Kazutoshi; Hoshiko, Tomonori; Minami, Norio; and Shoji, Tadao, 4,977,165, Cl. 514-318.000.

Miyake, Masao: *See*—
Itagaki, Takaharu; Okada, Hiroyoshi; Miyake, Masao; Kobayashi, Takaaki; Tosa, Takahumi; and Satou, Hiroyuki, 4,976,976, Cl. 426-69.000.

Miyama, Shuji; and Ohkumo, Hiroya, to Fuji Jukogyo Kabushiki Kaisha. Trouble detector system for an intake system of an automotive engine. 4,976,139, Cl. 73-117.300.

Miyamoto, Alfonso T., to Meddiss, Incorporated. Pulsatile flow delivery apparatus. 4,976,593, Cl. 417-476.000.

Miyamoto, Masayoshi: *See*—
Shimada, Kazuyuki; Niito, Yoshiharu; Kiya, Yikitoshi; Yagishita, Takahiro; Miyamoto, Masayoshi; Azumai, Hideo; and Iwazaki, Keiichi, 4,977,414, Cl. 346-154.000.

Miyamoto, Naooki: *See*—
Kawamura, Takao; Miyamoto, Naooki; Ito, Hiroshi; Takemura, Hitoshi; and Ishibutsu, Kokichi, 4,977,050, Cl. 430-57.000.

Miyamoto, Tetsuya: *See*—
Kayane, Yutaka; Omura, Takashi; Harada, Naoki; Mori, Yasuji; Yamamoto, Yosuke; Miyamoto, Tetsuya; and Kusumoto, Takehiro, 4,977,261, Cl. 544-199.000.

Miyamoto, Yuujirou: *See*—
Shindo, Nobuaki; Naruse, Seiji; Maeda, Fumiaki; Miyamoto, Yuujirou; and Takeuchi, Toshio, 4,976,369, Cl. 220-270.000.

Miyaoka, Shuuichi; Odaka, Masanori; and Ogiue, Katsumi, to Hitachi, Ltd. High speed bipolar-MOS logic circuit including a series coupled arrangement of a bipolar transistor and a logic block having a MOSFET. 4,977,338, Cl. 307-446.000.

Miyata, Keiji: *See*—
Ohta, Mitsuaki; Koide, Tokuo; Suzuki, Takeshi; Matsuhisa, Akira; Yanagisawa, Isao; and Miyata, Keiji, 4,977,175, Cl. 514-394.000.

Miyoshi, Atsuo: *See*—
Hosoya, Yoshio; Watanabe, Naotaka; Takagi, Isao; and Miyoshi, Atsuo, 4,977,208, Cl. 524-515.000.

Mizui, Takuji: *See*—
Matsumoto, Saichi; Doteuchi, Masami; Mizui, Takuji; and Hirai, Kentaro, 4,977,170, Cl. 514-352.000.

Mizuno, Kenichi: *See*—
Ishigaki, Yukinobu; and Mizuno, Kenichi, 4,977,578, Cl. 375-1.000.

Mizuno, Toshiya; Teramoto, Yoshikichi; Saito, Takeshi; and Wakabayashi, Juichi, to Kureha Kagaku Kogyo K. K. Poly(arylene sulfide) sheet production process. 4,976,908, Cl. 264-210.200.

Mizuno, Touru; and Kitajima, Yasuhiko, to TDK Corporation. Method of and apparatus for optically checking the appearances of chip-type components and sorting the chip-type components. 4,976,356, Cl. 209-539.000.

Mizusawa, Nobutoshi: *See*—
Ebinuma, Ryuichi; Chiba, Yuji; and Mizusawa, Nobutoshi, 4,977,459, Cl. 358-296.000.

Mochizuki, Chizuko: *See*—
Asai, Keiichi; Mochizuki, Chizuko; and Hori, Kazunobu, 4,976,488, Cl. 296-155.000.

Mochizuki, Kiyohumi: *See*—
Ryu, Shiro; and Mochizuki, Kiyohumi, 4,977,564, Cl. 372-32.000.

Moehle, William E.: *See*—
Mungall, Thomas G.; and Moehle, William E., 4,976,933, Cl. 423-210.000.

Moellers, Gerd: *See*—
Pleschiutschnigg, Fritz-Peter; Parschat, Lothar; Bunau, Armin; Rahmfeld, Werner; Moellers, Gerd; Ehrenberg, Hans-Juergen; and Eberhardt, Hans G., 4,976,306, Cl. 164-476.000.

Moghe, Sanjay B.: *See*—
Podell, Allen F.; Mitchell, Scott W.; Moghe, Sanjay B.; and Ali, Fazal, 4,977,382, Cl. 333-164.000.

Mogi, Kinichi: *See*—
Hasegawa, Hiroshi; Mogi, Kinichi; Shioiri, Noriaki; Sato, Susumu; and Katori, Tatsuhiko, 4,977,275, Cl. 548-539.000.

Mohaupt, Henry H. Technique and apparatus for stimulating long intervals. 4,976,318, Cl. 166-311.000.

Mohler, Robert D.; and Liao, James C., to Eastman Kodak Company. Apparatus for the measurement of snow quality. 4,977,523, Cl. 364-550.000.

Mohri, Motoo, to Sharp Kabushiki Kaisha. Solid-state electrolytic battery. 4,977,045, Cl. 429-192.000.

Moldenhaur, Detlev B.: *See*—
Adrian, Willy; and Moldenhaur, Detlev B., 4,976,345, Cl. 198-323.000.

Molex Incorporated: *See*—
Gottardo, Fulvio; and Checchinato, Bruno, 4,976,635, Cl. 439-849.000.

Molia, Emelio C., to Aragonesa de Componentes Pasivos, S.A. Adjusting potentiometer for electronic circuits, process for assembling the elements thereof and process for obtaining the resistive plate thereof. 4,977,387, Cl. 338-174.000.

Molnlycke AB: *See*—
Hanssen, Carl-Otto, 4,976,274, Cl. 128-849.000.

Moltrasio, Mario. Method for unbinding a stack of sacks. 4,976,583, Cl. 414-786.000.

Momoi, Toshimitsu: *See*—
Ohtani, Hideya; Momoi, Toshimitsu; Ooi, Eiji; Sakuraba, Shuhei; Morita, Masayuki; and Wakashima, Yoshiaki, 4,977,441, Cl. 357-70.000.

Mondek, Martin J.: *See*—
Bland, Gerald F.; Mondek, Martin J.; and Zdanowicz, Lawrence E., 4,976,640, Cl. 440-61.000.

Monkowski, Joseph R.; and Logan, Mark A., to Lam Research Corporation. Chemical vapor deposition reactor and method of use thereof. 4,976,996, Cl. 427-255.500.

Monsanto Company: *See*—
Woodard, Floyd E., 4,976,503, Cl. 350-1.700.

Montagne, Xavier: *See*—
Denis, Jacques; Montagne, Xavier; Mulard, Philippe; and Eber, Daniele, 4,976,746, Cl. 44-330.000.

Monteil, Pierre: *See*—
Miege, Christian; Monteil, Pierre; and Obrecht, Gerard, 4,976,534, Cl. 351-161.000.

Moore Business Forms, Inc.: *See*—
Macaulay, Norman, 4,977,131, Cl. 503-201.000.

Moore, Christine H.: *See*—
Stang, John H.; Moore, Christine H.; and Ouwerkerk, Rien, 4,976,225, Cl. 123-41.740.

Moore, Craig A.: *See*—
Borkowicz, Neil L.; and Moore, Craig A., 4,977,532, Cl. 364-708.000.

Moore, David L.: *See*—
Ferguson, Thomas H.; Harrison, Roger G.; and Moore, David L., 4,977,140, Cl. 514-12.000.

Moore, Lyman T.; and Travers, Mark D., to Great Lakes Carbon Corporation. Safety flow stopper for water-cooled electrode. 4,977,576, Cl. 373-93.000.

Moore, Robert R.: *See*—
Andrews, E. Trent; and Moore, Robert R., 4,976,702, Cl. 604-198.000.

Moos, Walter H.: *See*—
Johnson, Stephen J.; and Moos, Walter H., 4,977,172, Cl. 514-374.000.

Moraitis, Thrasyvoulas: *See*—
Beukes, Christo A.; Patz, Vivian E.; and Moraitis, Thrasyvoulas, 4,976,199, Cl. 102-200.000.

Moran, John D., to Motorola Inc. Method for manufacturing semiconductor rectifier. 4,977,107, Cl. 437-225.000.

Morariu, Gavril: *See*—
Szabo, Louis, deceased; Morariu, Gavril; and Banister, Eric W., 4,976,426, Cl. 272-130.000.

Morel, Claude: *See*—
Sevrin, Mireille; George, Pascal; Menin, Jacques; Morel, Claude; and Bigg, Dennis, 4,977,159, Cl. 514-292.000.

Morel-Fisher, Theodor: *See*—
Herzlinger, Andrei; Shorr, Leonard M.; Antebi, Salomone; Morel-Fisher, Theodor; Utevskii, Lev; and Scheinert, Yaakov, 4,977,262, Cl. 544-221.000.

Morgan, Jack B. Video switching systems using frequency agile modulators and demodulators. 4,977,449, Cl. 358-86.000.

Morgan, Lee R.: *See*—
Hayman, Michael H.; Morgan, Lee R.; and Liprie, Samuel F., 4,976,680, Cl. 600-7.000.

Mori, Nobufumi; and Oikawa, Tetsuo, to Fuji Photo Film Co., Ltd. Electron microscope which prevents undesired X-ray exposure. 4,977,321, Cl. 250-311.000.

Mori, Yasuji: *See*—
Kayane, Yutaka; Omura, Takashi; Harada, Naoki; Mori, Yasuji; Yamamoto, Yosuke; Miyamoto, Tetsuya; and Kusumoto, Takehiro, 4,977,261, Cl. 544-199.000.

Mori, Yoshiaki; Takagi, Hiroshi; and Sakabe, Yukio, to Murata Manufacturing Co., Ltd. Monolithic ceramic capacitor. 4,977,485, Cl. 361-321.000.

Morimitu, Yasunasa; and Yamashita, Shinichi, to Jidosha Kiki Co., Ltd. Method and apparatus for coating shear-staked peripheral portions of coated shell. 4,976,998, Cl. 427-284.000.

Morin, Louis G., to American Cyanamid Company. Chaff comprising metal coated fibers. 4,976,828, Cl. 204-28.000.

Morisaki, Hiroshi: *See*—
Asai, Shin; Akao, Michitoshi; Katoh, Tokunori; Sakakibara, Kenji; Izaki, Takesi; and Morisaki, Hiroshi, 4,977,437, Cl. 355-27.000.

Morisato, Rodney N.: *See*—
Oshiro, Gary T.; and Morisato, Rodney N., 4,976,041, Cl. 33-392.000.

Morishige, Yukio: *See*—
Kishida, Shunji; Yokoyama, Hiroyuki; Morishige, Yukio; and Washio, Kunihiko, 4,976,930, Cl. 422-186.300.

Morishita, Masakazu, to Sharp Kabushiki Kaisha. Method and device for detecting blocked condition in a tube of a liquid infusion pump. 4,976,151, Cl. 73-730.000.

Morita, Masayuki: *See*—
Ohtani, Hideya; Momoi, Toshimitsu; Ooi, Eiji; Sakuraba, Shuhei; Morita, Masayuki; and Wakashima, Yoshiaki, 4,977,441, Cl. 357-70.000.

Morita, Mitsuhiko; Toda, Yasuhiko; and Yamamoto, Tetuo, to Ube Industries, Ltd. Magnesia granule coated with silica or forsterite. 4,977,024, Cl. 428-404.000.

Moriya, Atusi: *See*—
Tsuneki, Hideaki; Ariyoshi, Kimio; Moriya, Atusi; and Ueshima, Michio, 4,977,118, Cl. 502-35.000.

Morris, John M.; and St. John, Roger, to GT Development Corporation. Combined switch and valve for compressor powered inflatable. 4,976,104, Cl. 60-412.000.

Morrison, Robert C.; and Rathman, Terry L., to Lithium Corporation of America. Preparation of organometallic and organobimetallic compounds. 4,976,886, Cl. 252-182.300.

Morton International, Inc.: *See*—
Correa, Jose L.; Stumpf, Robert C.; Farnum, Charles L.; and Roos, Leo, 4,976,817, Cl. 156-555.000.

Morton Thiokol Inc.: *See*—
Biddle, Richard A.; and Willer, Rodney L., 4,976,794, Cl. 149-19.500.

Mostert, Simone: *See*—
Hwo, Charles C.; and Mostert, Simone, 4,977,206, Cl. 524-504.000.

Mostyn, William T.: *See*—
Gibbs, Walden L., Jr.; Curry, Jimmie L.; and Mostyn, William T., 4,977,517, Cl. 364-510.000.

Motegi, Takeo; Sakuraba, Yasuya; Iguchi, Hiroyuki; and Kasahara, Kaoru, to Hodogaya Chemical Co., Ltd. Plant growth regulant. 4,976,768, Cl. 71-76.000.

Motoi, Yoshihiko; Yamamoto, Naoki; and Takano, Yukio, to Horiba, Ltd. Apparatus for heating sample within vacuum chamber. 4,977,307, Cl. 219-392.000.

Motor Wheel Corporation: *See*—
Post, Charles C.; and Swartz, Roger E., 4,976,497, Cl. 301-37.00R.

Motorola, Inc.: *See*—
Babico, John Y.; and Petrie, Adelore F., 4,977,477, Cl. 361-98.000.
Birger, Ari, 4,977,535, Cl. 364-748.000.
Blumenshine, Kent M.; Marcus, Harris L.; and Long-Daugherty, Kathleen A., 4,976,814, Cl. 156-277.000.

Carlson, Eric J., 4,976,619, Cl. 434-16.000.
Holcomb, Don R., Sr.; Brown, Mark J.; and Schumacher, Lawrence R., 4,977,613, Cl. 455-182.000.
Johnson, Brian K. A.; and Patsiokas, Stelios J., 4,977,589, Cl. 379-58.000.
Kielmeyer, Ronald F., 4,977,379, Cl. 331-56.000.
Kurcbart, Robert, 4,977,614, Cl. 455-193.000.
Linder, Donald L.; Goode, Steve H.; Kazecki, Henry L.; Dennis, Donald W.; and Baker, James C., 4,977,616, Cl. 455-277.000.
Main, William E., 4,977,381, Cl. 331-111.000.
Moran, John D., 4,977,107, Cl. 437-225.000.
Tarbouriech, Jean-Claude, 4,977,541, Cl. 365-189.110.
Tsuchiya, Kazuhisa; Enosawa, Yoshio; and Kitajima, Motohiro, 4,977,436, Cl. 357-236.000.
Waldo, Whitson G., III, 4,977,048, Cl. 430-22.000.
Wilson, Timothy J., 4,977,612, Cl. 455-166.000.

Motoyama, Tetsuro: *See*—
Chang, Hershow; Kim, Seong; and Motoyama, Tetsuro, 4,977,519, Cl. 364-519.000.

Mountain Medical Equipment, Inc.: *See*—
Higson, James R.; D'Alfonso, David A.; and Walls, Robert R., 4,976,259, Cl. 128-200.180.

Mraz, Dennis Z.; and Mahyera, Anil, to Engineered Instruments, Inc. Anchor device for securing rock bolts. 4,976,571, Cl. 405-261.000.

MTU Motoren- und Turbinen Union Muenchen GmbH: *See*—
Feitzelmayer, Ernst, 4,976,796, Cl. 156-49.000.

MTU Motoren- Und Turbinen-Union Munchen GmbH: *See*—
Jabs, Alfred, 4,976,310, Cl. 165-82.000.

Muan, Arnulf: *See*—
Najjar, Nitri S.; and Muan, Arnulf, 4,977,130, Cl. 502-351.000.

Muchmore, Andrew V.; and Decker, Jean M., to United States of America, Health and Human Services. Uromodulin and a process of purifying it. 4,977,244, Cl. 530-350.000.

Mud Motors, Inc.: *See*—
Hebert, Edwin D., Sr., 4,976,655, Cl. 464-16.000.

Mueller-Mall, Rudolf: *See*—
Kerth, Juergen; Werner, Rainer A.; Zolk, Ralf; Ruempler, Klaus-Dieter; Schweier, Guenther; Mueller-Mall, Rudolf; and Gruber, Wolfgang, 4,977,210, Cl. 525-53.000.

Mueller, Richard L., Jr.: *See*—
Machold, Timothy R.; Mar, Craig E.; Mueller, Richard L., Jr.; and Shanahan, John P., 4,976,720, Cl. 606-194.000.

Mueller, Walter B., to W. R. Grace & Co.-Conn. Barrier stretch film. 4,977,022, Cl. 428-349.000.

Muendlein, Werner; Scheer, Gerhard; and Stolz, Gerhard, to KOMET Stahlhalter- und Werkzeugfabrik Robert Breuning GmbH. Device for connecting two tool parts. 4,976,574, Cl. 409-232.000.

Muhs, Jeffrey D.: *See*—
Yannuzzi, Gilbert N., Jr.; and Muhs, Jeffrey D., 4,976,674, Cl. 493-195.000.

Mukai, Hiromu; Karasaki, Toshihiko; and Hayashi, Kohtaro, to Minolta Camera Kabushiki Kaisha. Light measuring device for camera. 4,977,424, Cl. 354-410.000.

Mukai, Nobuhiro: *See*—
Sasaki, Isao; Mukai, Nobuhiro; and Ige, Hitoshi, 4,977,197, Cl. 522-14.000.

Mulard, Philippe: *See*—
Denis, Jacques; Montagne, Xavier; Mulard, Philippe; and Eber, Daniele, 4,976,746, Cl. 44-330.000.

Mullens, Paul A.: *See*—
Baker, Joseph R.; Golland, Wesley A.; Mullens, Paul A.; and Trimble, Roger B., 4,977,502, Cl. 364-405.000.

Munari, Fausto, to Carlo Erba Strumentazione S.p.A. Method and device for the control of gas chromatographic functions. 4,976,750, Cl. 55-21.000.

Munday, Mark L.; Doby, William P.; and Loose, Robert A., to ABB Power T&D Company. Electric utility meter with electronic register. 4,977,368, Cl. 324-142.000.

Mundy, Roy E.: *See*—
Beal, Thomas J.; Karabin, Tadeusz; and Mundy, Roy E., 4,976,253, Cl. 126-512.000.

Mungall, Thomas G.; and Moehle, William E., to Ethyl Corporation. Hydrogen stream purification. 4,976,933, Cl. 423-210.000.

Munir, Zuhair A.: *See*—
Musket, Ronald G.; Brown, David W.; and Munir, Zuhair A., 4,976,987, Cl. 427-38.000.

Murai, Nobuyoshi; Takahashi, Yoshinori; and Katayama, Kazuyoshi, to Takenaka Corporation, A Japanese Corporation. Damping support structure. 4,976,415, Cl. 267-136.000.

Murakami, Tomoyoshi: *See*—
Matsuo, Shigeru; Murakami, Tomoyoshi; Bando, Thoru; and Nagatoshi, Kikuo, 4,977,234, Cl. 528-211.000.

Murakami, Yoji: *See*—
Suzuki, Toshiaki; Murakami, Yoji; Kobayashi, Masao; and Yamauchi, Osamu, 4,977,442. Cl. 357-70.000.

Murata, Kazuyuki; Kanno, Kinya; and Kanamori, Katsuhiro, to Matsushita Electric Industrial Co., Ltd. Color image processing apparatus having exact color reproduction capability. 4,977,448, Cl. 358-75.000.

Murata Manufacturing Co., Ltd.: *See*—
Mori, Yoshiaki; Takagi, Hiroshi; and Sakabe, Yukio, 4,977,485, Cl. 361-321.000.
Uchida, Katsuyuki, 4,977,309, Cl. 219-541.000.

Murata, Moriyasu: *See*—
Nebashi, Tsutomu; Iguchi, Kazuo; and Murata, Moriyasu, 4,977,204, Cl. 524-186.000.

Murata, Yasushi; and Tanaka, Satoru, to Pioneer Electronic Corporation. Liquid crystal display device. 4,976,514, Cl. 350-345.000.

Murata, Yasushi, to Pioneer Electronic Corporation. Luminescent screen. 4,977,326, Cl. 250-483.100.

Murayama, Hiroki; Tsujisawa, Takahiko; and Hashimoto, Toshikazu, to NEC Corporation. Track-following control system for magnetic disk drive. 4,977,470, Cl. 360-77.040.

Murayama, Junichi; Iiyama, Kazuto; Toyama, Niichi; Sadamitsu, Katsushi; and Takashima, Hideki, to Honda Giken Kogyo Kabushiki Kaisha. Painting method. 4,977,000, Cl. 427-424.000.

Muroi, Katsumi: *See*—
Oba, Sayoko; Muroi, Katsumi; Okuna, Kenji; Ohtsuka, Hidefumi; Iimura, Tsutomu; Kojima, Ryoji; and Kurihara, Keisuke, 4,977,415, Cl. 346-155.000.

Murota, Junichi: *See*—
Hiratsuka, Yutaka; Ohmi, Tadahiro; Murota, Junichi; Fujisaki, Yoshio; Noda, Masato; Kitada, Yoshimitsu; and Sahara, Terutaka, 4,976,815, Cl. 156-345.000.

Murrer, Barry A.; Overstall, John; and Willis, Peter M. Process for making a polymer-modified electrode and process using same for chloralkali electrolysis. 4,976,831, Cl. 204-98.000.

Musket, Ronald G.; Brown, David W.; and Munir, Zuhair A., to United States of America, Energy. Process for forming one or more substantially pure layers in substrate material using ion implantation. 4,976,987, Cl. 427-38.000.

Musser, Deborah L.: *See*—
Felter, Richard E.; Markley, Dean A.; and Musser, Deborah L., 4,976,890, Cl. 252-511.000.

Myers, Jimmy; and Wilson, Wilfred W., to Dow Chemical Company, The. Amino piperazine esters showing biocidal activity. 4,977,156, Cl. 514-255.000.

Myers, Ronald K. Scrubbing shower sandal. 4,976,049, Cl. 36-8.100.

Nack, Herman: *See*—
Maringer, Robert E.; Nack, Herman; and Razgaitis, Richard, 4,976,934, Cl. 423-210.000.

Nagahama, Yasuhide, to Kabushiki Kaisha Kobe Seiko Sho. Backlash removing mechanism for industrial robot. 4,976,165, Cl. 74-400.000.

Nagano, Kazuhiko: *See*—
Rikimaru, Hiroaki; Nakatsuji, Tadao; Umaba, Toshikatsu; Nagano, Kazuhiko; Mishina, Kazuya; and Shimizu, Hiromitsu, 4,977,127, Cl. 502-309.000.

Nagao, Kazushi: *See*—
Nakamura, Shizuo; Inai, Masatoshi; Inoue, Makoto; Nagao, Kazushi; and Tsuda, Yoshiaki, 4,977,179, Cl. 514-423.000.

Nagashima, Yasuo; Soeda, Haruo; Sato, Masamichi; and Kubo, Takashi, to Fuji Photo Film Co., Ltd. Magnetic sheet polishing device. 4,976,020, Cl. 29-90.010.

Nagata, Kouichi: *See*—
Ohishi, Masao; Kida, Katsuaki; Ishikawa, Katsukiyo; Saito, Takao; and Nagata, Kouichi, 4,977,053, Cl. 430-106.600.

Nagata, Kunio: *See*—
Fushiya, Fusao; Hayashi, Akiharu; Itsuki, Fumiaki; and Nagata, Kunio, 4,977,358, Cl. 318-268.000.

Nagata, Takehito: *See*—
Ino, Masumitsu; Kohata, Mitsuhiro; Itagaki, Masanori; Nagata, Takehito; and Tanaka, Hiroyuki, 4,977,304, Cl. 250-208.100.

Nagata, Tatsuya; Yamada, Takehiko; Hara, Eiichi; and Watanabe, Michihiro, to Hitachi, Ltd. Facsimile equipment with direct-contact-type image sensor. 4,977,313, Cl. 250-208.100.

Nagato, Hirokazu: *See*—
Kanno, Takao; Koda, Yutaka; and Nagato, Hirokazu, 4,976,883, Cl. 252-62.520.

Nagatomi, Tateyuki: *See*—
Ohba, Noriaki; Tabata, Yujin; Nagatsuka, Masaaki; Nagatomi, Tateyuki; and Klicker, Helmut, 4,976,743, Cl. 8-543.000.

Nagatoshi, Kikuo: *See*—
Matsuo, Shigeru; Murakami, Tomoyoshi; Bando, Thoru; and Nagatoshi, Kikuo, 4,977,234, Cl. 528-211.000.

Nagatsuka, Masaaki: *See*—
Ohba, Noriaki; Tabata, Yujin; Nagatsuka, Masaaki; Nagatomi, Tateyuki; and Klicker, Helmut, 4,976,743, Cl. 8-543.000.

Nagel, Dietmar. Hand-held video game image-projecting and control apparatus. 4,976,429, Cl. 273-1.00E.

Nagel, Karl: *See*—
Kohl, Walter; and Nagel, Karl, 4,977,340, Cl. 307-520.000.

Nagorny, Ulrich: *See*—
Hoefer, Rainer; Gruetzmacher, Roland; Gress, Wolfgang; and Nagorny, Ulrich, 4,977,207, Cl. 524-507.000.

Nagumo, Mutsumi; Nakagawa, Wataru; and Tsuruoka, Michihiko, to Fuji Electric Co., Ltd. Karman vortex flow meter. 4,976,153, Cl. 73-861.030.

Nahrup, Todd H.: *See*—
Davis, Walter R.; and Nahrup, Todd H., 4,976,570, Cl. 405-79.000.

Nair, Muraleedharan G., to Board of Trustees operating Michigan State University. Production, isolation, and identification of novel antifungal compounds. 4,977,084, Cl. 435-78.000.

Najjar, Nitri S.; and Muan, Arnulf, to Texaco Inc. Compositions involving V_2O_3-Al_2O_3-TiO_2. 4,977,130, Cl. 502-351.000.

Nakabayashi, Shigemitsu: *See*—
Tanaka, Kouji; Kondo, Syugo; Imura, Takeshi; Ando, Katsuhiko; and Nakabayashi, Shigemitsu, 4,976,305, Cl. 164-458.000.

Nakagawa, Ryoji, to Shibuya Kogyo Co., Ltd. Three dimensional simultaneous machining and measuring system. 4,977,512, Cl. 364-474.370.

Nakagawa, Wataru: *See*—
Nagumo, Mutsumi; Nakagawa, Wataru; and Tsuruoka, Michihiko, 4,976,153, Cl. 73-861.030.

Nakai, Masaaki: *See*—
Tsuji, Kenji; Izumi, Shuji; Nakai, Masaaki; and Taniguchi, Nobuyuki, 4,977,423, Cl. 354-402.000.

Nakajima, Makoto; Ohashi, Yoshio; Chuma, Toshio; Hatori, Kazuo; Araki, Isao; Koizumi, Masahiro; Onuki, Jin; Suzuki, Hitoshi; and Okikawa, Susumu, to Hitachi, Ltd. Semiconductor device and production process thereof, as well as wire bonding device used therefor. 4,976,393, Cl. 228-111.000.

Nakajima, Masahiro: *See*—
Yamamoto, Masato; Yamanaka, Toshimasa; and Nakajima, Masahiro, 4,977,425, Cl. 354-474.000.

Nakajima, Nobuyuki; Inomata, Kenichi; Okada, Shigeru; and Eitai, Kazuo, to Diesel Kiki Co., Ltd. Variable capacity vane compressor. 4,976,592, Cl. 417-295.000.

Nakajima, Tadakatsu; Kuwahara, Heikichi; Ohashi, Shigeo; Satoh, Motohiro; Yamada, Toshihiro; Kasai, Kenichi; Kobayashi, Satomi; and Watanabe, Akihide, to Hitachi, Ltd. Semiconductor cooling apparatus. 4,977,444, Cl. 357-82.000.

Nakamichi Corporation: *See*—
Aruga, Mutsumi; and Nakamichi, Niro, 4,977,468, Cl. 360-75.000.

Nakamichi, Niro: *See*—
Aruga, Mutsumi; and Nakamichi, Niro, 4,977,468, Cl. 360-75.000.

Nakamori, Takashi: *See*—
Amano, Shigeru; Takarabe, Tsuyoshi; Oda, Hiroshi; Nakamori, Takashi; Watanabe, Satoshi; and Taira, Masamichi, 4,976,780, Cl. 75-375.000.

Nakamura, Koichi: *See*—
Ishikawa, Shunichi; and Nakamura, Koichi, 4,977,057, Cl. 430-138.000.

Nakamura, Kunie: *See*—
Kakimoto, Norihiro; Nakamura, Kunie; and Yoshihara, Toru, 4,977,287, Cl. 556-83.000.

Nakamura, Mikio: *See*—
Ishida, Kouichi; Nakamura, Mikio; and Takayama, Yukio, 4,977,133, Cl. 503-226.000.

Nakamura, Mitsuru: *See*—
Tanaka, Naoyuki; Nakamura, Yozo; Arai, Akira; Nakamura, Mitsuru; Endo, Tsunehiro; and Kadomukai, Yuzo, 4,977,508, Cl. 364-431.080.

Nakamura, Shizuo; Inai, Masatoshi; Inoue, Makoto; Nagao, Kazushi; and Tsuda, Yoshiaki, to Otsuka Pharmaceutical Factory, Inc. Proline derivatives. 4,977,179, Cl. 514-423.000.

Nakamura, Tsutomu: *See*—
Itoh, Kunio; Fukuda, Takeshi; and Nakamura, Tsutomu, 4,977,200, Cl. 523-223.000.

Nakamura, Yasuhisa: *See*—
Obuchi, Yasuji; Hamada, Akira; Akiyama, Hirokatsu; and Nakamura, Yasuhisa, 4,976,182, Cl. 84-462.000.

Nakamura, Yozo: *See*—
Tanaka, Naoyuki; Nakamura, Yozo; Arai, Akira; Nakamura, Mitsuru; Endo, Tsunehiro; and Kadomukai, Yuzo, 4,977,508, Cl. 364-431.080.

Nakano, Atsushi: *See*—
Takanashi, Itsuo; Ichitou, Toshikatsu; Kitamura, Hiroki; Yamamura, Takashi; Sakagami, Koubun; and Nakano, Atsushi, 4,977,417, Cl. 346-160.000.

Nakano, Shinji; Tsutsui, Koichi; Ikeda, Shoji; and Hirasawa, Yoji, to Nippon Paint Co., Ltd. Paint resin. 4,976,785, Cl. 106-287.170.

Nakao, Akihiro, to Fuji Jukogyo Kabushiki Kaisha. Device for locking trunk lid of motor vehicle. 4,976,477, Cl. 292-201.000.

Nakasone, Takayoshi; Kozuka, Kenji; and Kimura, Haruo, to Ube-Nitto Kasei Co., Ltd. Method and apparatus for shaping a continuous rod-like molding. 4,976,906, Cl. 264-139.000.

Nakata, Michio: *See*—
Nozawa, Seiichi; Utsumi, Shigeo; and Nakata, Michio, 4,977,230, Cl. 528-125.000.

Nakata, Tomohiro, to Fuji Photo Film Co., Ltd. Magnetic tape wind-up control method, and tape wind-up apparatus. 4,977,466, Cl. 360-73.080.

Nakatani, Hajime; Minowa, Yoshibumi; and Wakata, Hitoshi, to Mitsubishi Denki Kabushiki Kaisha. Laser apparatus. 4,977,563, Cl. 372-32.000.

Nakatani, Hajime: *See*—
Tashiro, Koichi; Ikezawa, Mamoru; Sano, Takashi; Matsuura, Kosei; and Nakatani, Hajime, 4,976,438, Cl. 273-313.000.

Nakatsugawa, Hiroshi: *See*—
Tani, Toshio; Kamiyama, Osamu; Matsuki, Noborn; Fukuda, Ryosaku; Akutsu, Tsukasa; and Nakatsugawa, Hiroshi, 4,976,826, Cl. 204-12.000.

Nakatsuji, Tadao: *See*—
Rikimaru, Hiroaki; Nakatsuji, Tadao; Umaba, Toshikatsu; Nagano, Kazuhiko; Mishina, Kazuya; and Shimizu, Hiromitsu, 4,977,127, Cl. 502-309.000.

Nakaya, Hiroaki: *See*—
Tanaka, Koichi; Yamashita, Takuo; Yamaue, Satoshi; and Nakaya, Hiroaki, 4,977,350, Cl. 313-505.000.

Nakazato, Takashi: *See*—
Yamaguchi, Morio; Kudoh, Yasunori; and Nakazato, Takashi, 4,976,553, Cl. 400-124.000.

Nalco Chemical Company: *See*—
Banks, Rodney H.; and Shah, Jitendra T., 4,976,871, Cl. 210-709.000.

Namco Ltd.: *See*—
Tashiro, Koichi; Ikezawa, Mamoru; Sano, Takashi; Matsuura, Kosei; and Nakatani, Hajime, 4,976,438, Cl. 273-313.000.

Naoi, Takashi: *See*—
Kanetake, Satoshi; Hashimoto, Shinichi; Ono, Shigetoshi; and Naoi, Takashi, 4,977,071, Cl. 430-534.000.

Naperski, Charles E.: *See*—
Wise, Jeffrey A.; and Naperski, Charles E., 4,976,371, Cl. 220-315.000.

Narisada, Masayuki; Ohtani, Mitsuaki; Watanabe, Fumihiko; Hagishita, Sanji; Seno, Kaoru; and Kamata, Susumu, to Shionogi & Co., Ltd. Bicyclic sulfonamide derivatives. 4,976,891, Cl. 260-401.000.

Naruse, Seiji: *See*—
Shindo, Nobuaki; Naruse, Seiji; Maeda, Fumiaki; Miyamoto, Yujirou; and Takeuchi, Toshio, 4,976,369, Cl. 220-270.000.

Naser, Georg: *See*—
Reichenberger, Helmut; Naser, Georg; and Schmidt, Erhard, 4,976,255, Cl. 128-24.00A.

National Gypsum Company: *See*—
Menchetti, Robert J., 4,976,083, Cl. 52-489.000.

National Starch and Chemical Investment Holding Corporation: *See*—
Chiu, Chung-Wai, 4,977,252, Cl. 536-102.000.

Nattrass, Floyd C. Shotgun sighting system and method. 4,976,038, Cl. 33-233.000.

Nawa, Masayoshi: *See*—
Honjo, Toshio; Sato, Yuji; Fukushima, Yoshihiro; Nawa, Masayoshi; and Yasuda, Shinichiro, 4,977,054, Cl. 430-108.000.

Neale, Greville T.: *See*—
Gatley, Richard; Fox, Ian F.; and Neale, Greville T., 4,976,910, Cl. 264-278.000.

Nebashi, Tsutomu; Iguchi, Kazuo; and Murata, Moriyasu, to Kao Corporation. Non-aqueous shade enhancing agent. 4,977,204, Cl. 524-186.000.

NEC Corporation: *See*—
Denda, Akira, 4,977,339, Cl. 307-475.000.
Ishizuka, Shinichi; Suzuki, Takao; Umesato, Shoji; and Okada, Yoshikatsu, 4,976,624, Cl. 439-70.000.
Iwashima, Osamu, 4,977,317, Cl. 250-239.000.
Kishida, Shunji; Yokoyama, Hiroyuki; Morishige, Yukio; and Washio, Kunihiko, 4,976,930, Cl. 422-186.300.
Kohno, Akiyoshi; and Mikoshiba, Atsushi, 4,977,584, Cl. 377-58.000.
Kotaki, Hiroshi, 4,977,099, Cl. 437-52.000.
Maru, Tsuguo, 4,977,611, Cl. 455-161.000.
Murayama, Hiroki; Tsujisawa, Takahiko; and Hashimoto, Toshikazu, 4,977,470, Cl. 360-77.040.
Noguchi, Akira, 4,977,556, Cl. 370-60.000.
Numai, Takahiro, 4,976,513, Cl. 350-162.110.
Shimosaka, Naoki, 4,977,565, Cl. 372-32.000.
Ueyama, Shuziro, 4,976,555, Cl. 400-314.100.

NEC Home Electronics Ltd.: *See*—
Hirose, Mitsuo, 4,977,460, Cl. 358-336.000.

Neckers, Douglas C.: *See*—
Gottschalk, Peter; Neckers, Douglas C.; Schuster, Gary B.; Adair, Paul C.; and Pappas, S. Peter, 4,977,511, Cl. 364-473.000.

Needham, Anthony H.: *See*—
Ripley, Ian; and Needham, Anthony H., 4,976,278, Cl. 137-15.000.

Neff, Harlan: *See*—
Rudnick, Paul J.; Toldalagi, Paul M.; and Neff, Harlan, 4,977,503, Cl. 364-410.000.

Negami, Shin'ichi; Nomachi, Hiroshi; Nemoto, Toru; Tanaka, Yoshio; and Ohta, Akira, to Sandoz Ltd. Lignosulfonic graft copolymer as a cement dispersant. 4,977,227, Cl. 527-400.000.

Nehm, Holger: *See*—
Wildfang, Dieter; and Nehm, Holger, 4,976,283, Cl. 137-504.000.

Nelson, Robert E., to TPV Energy Systems, Inc. Thermophotovoltaic technology. 4,976,606, Cl. 431-79.000.

Nemoto, Toru: *See*—
Negami, Shin'ichi; Nomachi, Hiroshi; Nemoto, Toru; Tanaka, Yoshio; and Ohta, Akira, 4,977,227, Cl. 527-400.000.

Neri, Armando, to G.D. Societa' per Azioni. Method of inspecting the ends of stacked cigarettes. 4,976,544, Cl. 356-394.000.

Neri, Carlo: *See*—
Greco, Alberto; Busetto, Carlo; Cassar, Luigi; and Neri, Carlo, 4,977,259, Cl. 544-69.000.

Neumann, Peter: *See*—
Aumueller, Alexander; Neumann, Peter; and Trauth, Hubert, 4,976,889, Cl. 252-403.000.

New Discovery Ventures, Ltd.: *See*—
Kraemer, Sandy F., 4,976,439, Cl. 273-350.000.

Newcombe, Haydn J.; and Lowe, Jeffrey C., to Armitage Shanks Ltd. Thermostatic valves. 4,976,460, Cl. 236-12.120.

Newell, John A.: *See*—
Newell, William K.; Newell, John A.; and Newell, Shawn P., 4,976,637, Cl. 440-49.000.

Newell, Shawn P.: *See*—
Newell, William K.; Newell, John A.; and Newell, Shawn P., 4,976,637, Cl. 440-49.000.

Newell, William K.; Newell, John A.; and Newell, Shawn P. Outboard motor conversion kit. 4,976,637, Cl. 440-49.000.

Newman-Evans, Richard H.: *See*—
Gardner, Hugh C.; and Newman-Evans, Richard H., 4,977,215, Cl. 525-119.000.
Gardner, Hugh C.; and Newman-Evans, Richard H., 4,977,218, Cl. 525-329.300.

Newman, Roger C.: *See*—
Sieradzki, Karl; and Newman, Roger C., 4,977,038, Cl. 428-610.000.

Newnham, Robert E.: *See*—
Giniewicz, Jayne R.; Newnham, Robert E.; Cross, Leslie E.; and Safari, Ahmad, 4,977,547, Cl. 367-157.000.

Newport Filters, Inc.: *See*—
Solomon, Donald F., 4,976,857, Cl. 210-493.500.

Newski, Alejandro: *See*—
Rivas, Olegario; Newski, Alejandro; and Antunez, Simon, 4,976,591, Cl. 417-254.000.

NGK Insulators, Ltd.: *See*—
Kozuka, Yoshinari; and Kawaguchi, Shogo, 4,976,517, Cl. 350-355.000.
Matsuhisa, Tadaaki; and Iwasaki, Hiroyuki, 4,976,903, Cl. 264-86.000.
Matsui, Minoru, 4,977,112, Cl. 501-97.000.

NGK Spark Plug Co., Ltd.: *See*—
Okochi, Mikiyoshi; and Oshiro, Tetsuo, 4,976,147, Cl. 73-455.000.

Ngo, That T.; and Wong, Raphael C., to Bioprobe International. Integrated solid-phase immunoassay. 4,977,077, Cl. 435-7.000.

NHK Spring Co., Ltd.: *See*—
Ojima, Juji, 4,976,661, Cl. 474-138.000.

Niagara Lockport Industries Inc.: *See*—
Aldrich, W. Daniel, 4,976,293, Cl. 139-383.0AA.

Niagara Mohawk Power Corporation: *See*—
Saylor, Charles H. M.; and Jabbour, Kamal, 4,977,390, Cl. 340-521.000.

Nichols, Buford L.; and McKee, Kathryn S., to Baylor College of Medicine. Lactoferrin as a dietary ingredient promoting the growth of the gastrointestinal tract. 4,977,137, Cl. 514-6.000.

Nichols, Robert K.; and Zelle, Bruce R., to AT&T Bell Laboratories. Synchronization of non-continuous digital bit streams. 4,977,582, Cl. 375-118.000.

Nicholson, John W.: *See*—
Ellis, John; Nicholson, John W.; and Wilson, Alan D., 4,976,829, Cl. 204-38.700.

Nickel, Hans: *See*—
Schierling, Roland; Wissmann, Michael; Nickel, Hans; and Geyer, Werner, 4,976,246, Cl. 123-509.000.

Nicolaou, Kyriacos C.; and Caulfield, Thomas J., to University of Pennsylvania, Trustees of the. Glycolipids. 4,977,286, Cl. 552-4.000.

Nielsen, Flemming E.: *See*—
Jacobsen, Poul; Nielsen, Flemming E.; Honore, Tage; and Drejer, Jorgen, 4,977,155, Cl. 514-250.000.

Nielsen, Per G.: *See*—
Skovhage, Erik; Jorgensen, Eskil B.; Nielsen, Per G.; and Sorensen, Christian B., 4,976,981, Cl. 426-512.000.

Nienhuis, James I. Weedless fish lure. 4,976,060, Cl. 43-42.410.

Niesar, Gunter: *See*—
Benninghoff, Norbert; Jaensch, Manfred; Melzer, Jaroslav; Niesar, Gunter; and Schuster, Werner, 4,976,138, Cl. 73-73.000.

Nieto, Robert L.; and Rasmussen, Chris W., to LifeScan, Inc. Lancet ejector mechanism. 4,976,724, Cl. 606-182.000.

Nifco Inc.: *See*—
Fukumoto, Masumi, 4,976,350, Cl. 206-387.000.

Nigam, Anil K., to Fujitsu America, Inc. Method for servo formatting disc media for a floppy disk drive. 4,977,471, Cl. 360-77.080.

Nigh, Frank M.: *See*—
Bavaro, Joseph P.; and Nigh, Frank M., 4,977,351, Cl. 315-87.000.

Nihon Medix Co., Ltd.: *See*—
Hayama, Masaharu; Takaoka, Kenji; Torai, Yasushi; and Fukada, Toshiharu, 4,976,116, Cl. 62-441.000.

Nihon Surfactant Kogyo K.K.: *See*—
Ohba, Noriaki; Tabata, Yujin; Nagatsuka, Masaaki; Nagatomi, Tateyuki; and Klicker, Helmut, 4,976,743, Cl. 8-543.000.

Niimura, Toshinobu; Takahashi, Tadashi; Kashiba, Mutsuro; Sakai, Ko; and Kano, Tokio, to Olympus Optical Co., Ltd. Plate substrate immunoassay device and method for performing a multi-test immunoassay on a specimen. 4,977,078, Cl. 435-7.000.

Niiranen, Erkki O., to LK-Products Oy. Resonator structure. 4,977,383, Cl. 333-219.000.

Niito, Yoshiharu: *See*—
Shimada, Kazuyuki; Niito, Yoshiharu; Kiya, Yikitoshi; Yagishita, Takahiro; Miyamoto, Masayoshi; Azumai, Hideo; and Iwasaki, Keiichi, 4,977,414, Cl. 346-154.000.

Nikon Corporation: *See*—
Juen, Masahiro, 4,977,312, Cl. 250-208.100.
Kusaka, Yosuke; and Utagawa, Ken, 4,977,311, Cl. 250-201.800.

Nilsen, Joseph, to United States of America, Energy. Resonantly photopumped nickel-like erbium X-ray laser. 4,977,572, Cl. 372-69.000.

Ninomiya, Kunihiro: *See*—
Fujimori, Shinichiro; Yamazaki, Satoshi; Sugano, Mamoru; Kawamura, Makoto; Ninomiya, Kunihiro; Tobe, Akihiro; and Nitta, Issei, 4,977,151, Cl. 514-225.500.

Nippon CMK, Corp.: *See*—
Seki, Kamehru; and Kubo, Isamu, 4,976,573, Cl. 409-138.000.

Nippon Fillestar Co., Ltd.: *See*—
Ogawa, Yutaka, 4,976,011, Cl. 452-110.000.

Nippon Iron Powder Co. Ltd.: *See*—
Honjo, Toshio; Sato, Yuji; Fukushima, Yoshihiro; Nawa, Masayoshi; and Yasuda, Shinichiro, 4,977,054, Cl. 430-108.000.

Nippon Paint Co., Ltd.: *See*—
Nakano, Shinji; Tsutsui, Koichi; Ikeda, Shoji; and Hirasawa, Yoji, 4,976,785, Cl. 106-287.170.
Ohishi, Masao; Kida, Katsuaki; Ishikawa, Katsukiyo; Saito, Takao; and Nagata, Kouichi, 4,977,053, Cl. 430-106.600.

Nippon Petrochemicals Co., Ltd.: *See*—
Akazawa, Toshiyuki; Okaya, Takuji; Inoue, Takashi; and Kobayashi, Toshitaka, 4,977,212, Cl. 525-57.000.
Bommer, Jerry C.; and Burnham, Bruce F., 4,977,177, Cl. 514-410.000.

Nippon Piston Ring Co., Ltd.: *See*—
Shimomura, Soichi, 4,976,916, Cl. 419-25.000.

Nippon Shokubai Kagaku Kogyo Co., Ltd.: *See*—
Tsuneki, Hideaki; Ariyoshi, Kimio; Moriya, Atusi; and Ueshima, Michio, 4,977,118, Cl. 502-35.000.

Nippon Steel Corporation: *See*—
Amano, Shigeru; Takarabe, Tsuyoshi; Oda, Hiroshi; Nakamori, Takashi; Watanabe, Satoshi; and Taira, Masamichi, 4,976,780, Cl. 75-375.000.

Nippon Telegraph and Telephone Corporation: *See*—
Ohta, Kazuo; and Okamoto, Tatsuaki, 4,977,595, Cl. 380-24.000.
Yano, Norio; and Ishiguro, Ginya, 4,977,040, Cl. 428-692.000.

Nischik, Alexandr P.: *See*—
Gershuni, Alexandr N.; Maisotsenko, Valery S.; Kaminnik, Alexandr A.; Zaripov, Vladilen K.; Nischik, Alexandr P.; and Levterov, Alexandr I., 4,976,113, Cl. 62-314.000.

Nishi, Naomi; Kami, Shigetake; and Yamaguchi, Takashi, to Ryobi Limited. Aluminum die-casting alloys. 4,976,918, Cl. 420-546.000.

Nishide, Tsutomu: *See*—
Yasukawa, Takuji; Yasumura, Daisuke; Yamasawa, Kimiko; Tanaka, Yukitaka; and Nishide, Tsutomu, 4,976,984, Cl. 426-602.000.

Nishihara, Toshihiko, to Fuji Koki Mfg. Co., Ltd. Variable-capacitance type sensor and variable-capacitance type sensor system using the same. 4,977,480, Cl. 361-283.000.

Nishikawa, Masashi: *See*—
Hirakawa, Nobuhiko; Kashiwaba, Noriaki; Matsumoto, Hajime; Hosoda, Akihiko; Sekine, Yasuo; Isowa, Yoshikazu; Yamura, Tetsuaki; Sekine, Akihiro; and Nishikawa, Masashi, 4,977,267, Cl. 546-272.000.

Nishikawa, Yoshikazu: *See*—
Okamoto, Tatsuo; Kotani, Hideo; Oono, Takio; Watabe, Kiyoto; Kinoshita, Yasushi; and Nishikawa, Yoshikazu, 4,977,105, Cl. 437-190.000.

Nishimoto, Seiichi: *See*—
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.

Nishimura, Eiji: *See*—
Yoshikawa, Shoichi; Awazu, Yasunobu; and Nishimura, Eiji, 4,977,067, Cl. 430-398.000.

Nishimura, Takashi: *See*—
Takenaka, Shigeo; Kamohara, Eiji; and Nishimura, Takashi, 4,977,447, Cl. 358-66.000.

Nishino, Hiroshi, to Paloma Kogyo Kabushiki Kaisha. Pulse combustion apparatus. 4,976,604, Cl. 431-1.000.

Nissan Chemical Industries, Ltd.: *See*—
Fujikawa, Yoshihiro; Suzuki, Mikio; Iwasaki, Hiroshi; Sakashita, Mitsuaki; and Kitahara, Masaki, 4,977,161, Cl. 514-302.000.

Nissan Motor Co., Ltd.: *See*—
Honda, Naoki, 4,976,988, Cl. 427-42.000.
Hosaka, Akio, 4,976,239, Cl. 123-399.000.
Shiraishi, Yasuhiro, 4,977,389, Cl. 340-461.000.
Yoshihira, Noboru, 4,976,481, Cl. 293-133.000.

Nissan Motor Co., Ltd: *See*—
Nomaru, Minoru; and Takahama, Atsushi, 4,976,484, Cl. 294-119.100.

Nissin Kogyo Kabushiki Kaisha: *See*—
Horiuchi, Makoto; Shimizu, Atsushi; Miyakawa, Yoshitaka; and Sakurai, Kazuya, 4,976,105, Cl. 60-413.000.

Nitta, Issei: *See*—
Fujimori, Shinichiro; Yamazaki, Satoshi; Sugano, Mamoru; Kawamura, Makoto; Ninomiya, Kunihiro; Tobe, Akihiro; and Nitta, Issei, 4,977,151, Cl. 514-225.500.

Niwa, Minoru: *See*—
Kurosawa, Kimimasa; Harada, Chikao; Sakai, Hiroshi; and Niwa, Minoru, 4,976,268, Cl. 128-687.000.

Niwa, Takeshi, to Shimadzu Corporation. Arciform photosensor assembly. 4,977,314, Cl. 250-211.00R.

Nixon, Kim B.: *See*—
Mahaney, Bernard F., Jr.; Beck, Carl W.; Nixon, Kim B.; Connolly, Randolph; and Nunemaker, Terry V., 4,976,576, Cl. 411-121.000.

Nobusawa, Tatsuya: *See*—
Tsunoda, Takeo; Takeo, Setsu; Nobusawa, Tatsuya; Enomoto, Norihide; Takahashi, Hiroyasu; Watanabe, Minoru; Sasaki, Yutaka; and Tanaka, Kunihiro, 4,976,941, Cl. 423-247.000.

Noda, Masato: *See*—
Hiratsuka, Yutaka; Ohmi, Tadahiro; Murota, Junichi; Fujisaki, Yoshio; Noda, Masato; Kitada, Yoshimitsu; and Sahara, Terutaka, 4,976,815, Cl. 156-345.000.

Noe, Jeremy E., to Helene Curtis, Inc. Method and composition to impart improved conditioning properties to the hair. 4,976,956, Cl. 424-70.000.

Noerens, Willy J. Process and device for controlling the driving torque transmitted by a tractor to a hydraulically powered trailer. 4,976,331, Cl. 180-197.000.

Noerskau, Juergen; and Klingenbeck, Georg, to Linde Aktiengesellschaft. Load-sensing variable displacement pump controller with adjustable pressure-compensated flow control valve in feedback path. 4,976,106, Cl. 60-452.000.

Noguchi, Akira, to NEC Corporation. Packet switching system for a distributed processing ISDN switch. 4,977,556, Cl. 370-60.000.

Nohr, Ronald S.; and MacDonald, J. Gavin, to Kimberly-Clark Corporation. Method of cleaning melt-processing equipment with a thermoplastic polyolefin and a bifunctional siloxane. 4,976,788, Cl. 134-5.000.

Noise Cancellation Technologies, Inc.: *See—*
Ziegler, Eldon W., 4,977,600, Cl. 381-71.000.

Nok Corporation: *See—*
Kanno, Takao; Koda, Yutaka; and Nagato, Hirokazu, 4,976,883, Cl. 252-62.520.

Nokia Unterhaltungselektronik: *See—*
Durst, Klaus; and Reime, Gerd, 4,977,404, Cl. 341-176.000.

Nomachi, Hiroshi: *See—*
Negami, Shin'ichi; Nomachi, Hiroshi; Nemoto, Toru; Tanaka, Yoshio; and Ohta, Akira, 4,977,227, Cl. 527-400.000.

Nomaru, Minoru; and Takahama, Atsushi, to Nissan Motor Co., Ltd. Work positioning device for assembly line. 4,976,484, Cl. 294-119.100.

Nomix Manufacturing Company Limited: *See—*
Gill, David C.; and Ali, Eren, 4,976,465, Cl. 239-224.000.

Nomura, Noboru: *See—*
Hashimoto, Kazuhiko; Koizumi, Taichi; Kawakita, Kenji; and Nomura, Noboru, 4,976,818, Cl. 156-643.000.

Nonomura, Masamitu: *See—*
Arakawa, Satoshi; Nonomura, Masamitu; Ogoda, Makoto; Torii, Shumpeita; and Kohda, Katsuhiro, 4,977,327, Cl. 250-484.100.

Norbury, Robert J.; and Chang, Robert W. H., to Minnesota Mining and Manufacturing Company. Encapsulated cosmetic materials and process of making. 4,976,961, Cl. 424-401.000.

Nordisk Gentofte A/S: *See—*
Ejlersen, Henning M.; and Tullin, Flemming, 4,976,701, Cl. 604-192.000.

Nordstrom, Mark B., to Samsonite Corporation. Camera bag. 4,976,352, Cl. 206-316.200.

Noritake Co., Limited: *See—*
Yoshikawa, Nobuyoshi; and Asano, Hiroshi, 4,976,291, Cl. 138-175.000.

Normore, Andrew D.: *See—*
Casso, Christopher G.; Normore, Andrew D.; and Slagel, Peter S., 4,976,143, Cl. 73-151.500.

Norris, Gary R. Backpack belt construction. 4,976,383, Cl. 224-215.000.

Norris, Stephen G., to Veeder-Root Limited. Apparatus and method for determining the amount of material in a tank. 4,977,528, Cl. 364-571.040.

Norrvi, Hans; Warnstrom, Arne; and Wuopio, Jan-Erik. Device for a launcher on air vehicle. 4,976,183, Cl. 89-1.819.

Norsolor S.A.: *See—*
Garrigue, Roger; and Lalo, Jack, 4,977,237, Cl. 528-230.000.
Garrigue, Roger; and Lalo, Jack, 4,977,238, Cl. 528-230.000.

North American Philips Corp.: *See—*
Gibson, Ray G.; and Droho, Joseph, 4,977,346, Cl. 313-25.000.
Tero, John P., 4,977,378, Cl. 330-258.000.

North American Philips Corp, Signetics Division: *See—*
Broadbent, Eliot K., 4,976,809, Cl. 156-643.000.

Northern Telecom Limited: *See—*
McNicol, John D., 4,977,580, Cl. 375-97.000.
Phung, Van P. T.; and Kositpaiboon, Rungroj, 4,977,557, Cl. 370-85.600.
Toth, Robert B., 4,977,375, Cl. 324-511.000.

Norton-Alcoa: *See—*
Rumpf, David S.; and Lemieux, Paul R., 4,977,116, Cl. 501-128.000.

Norton, Shelley C.: *See—*
Goguen, George; and Norton, Shelley C., 4,976,219, Cl. 119-15.000.

Nothnick, Carl E., to Westinghouse Elecric Corp. Programmable if clutter canceller. 4,977,405, Cl. 342-162.000.

Nozawa, Minoru: *See—*
Yamanaka, Akihiro; Iida, Hiroshi; and Nozawa, Minoru, 4,977,413, Cl. 346-140.00R.

Nozawa, Seiichi; Utsumi, Shigeo; and Nakata, Michio, to Mitsubishi Chemical Industries Limited; and Diafoil Company, Limited. Heat-resistant film or sheet. 4,977,230, Cl. 528-125.000.

NSA Acquisition, Inc.: *See—*
Robinson, Bruce R., 4,976,894, Cl. 261-64.100.

NTN -Rulon Industries, Co. Ltd.: *See—*
Satoji, Fuminori, 4,976,880, Cl. 252-12.000.

NUKEM GmbH: *See—*
Braehler, Georg; Ganser, Benno; and Maurer, Paul-Gerhard, 4,976,569, Cl. 405-59.000.

Numai, Takahiro, to NEC Corporation. Tunable wavelength filter. 4,976,513, Cl. 350-162.110.

Nunemaker, Terry V.: *See—*
Mahaney, Bernard F., Jr.; Beck, Carl W.; Nixon, Kim B.; Connolly, Randolph; and Nunemaker, Terry V., 4,976,576, Cl. 411-121.000.

Nuovopignone-Industrie Meccaniche e Fonderia S.p.A.: *See—*
Mezzedimi, Vasco; and Frosini, Franco, 4,976,585, Cl. 415-118.000.

Nuzzolo, Carlo A.; Bernardi, Adriano; Pessi, Antonello; and Verdini, Antonio S., to Enitricerche S.p.A. Method for the determination of anti-P. falciparum sporozoite antibodies in human blood. 4,977,079, Cl. 435-7.000.

nView Corporation: *See—*
Vogeley, James H.; and Vogeley, Arthur W., 4,976,536, Cl. 353-77.000.

Nyman, Michael S., to Al-Site Corp. Hanger for displaying eyeglasses. 4,976,532, Cl. 351-158.000.

NYNEX Corporation: *See—*
Chen, Walter Y.; and Haddad, Richard A., 4,977,591, Cl. 379-410.000.

Oba, Sayoko; Muroi, Katsumi; Okuna, Kenji; Ohtsuka, Hidefumi; Iimura, Tsutomu; Kojima, Ryoji; and Kurihara, Keisuke, to Hitachi, Ltd.; Hitachi Koki Co., Ltd.; and Hitachi Metals, Ltd. Electrostatic recording head, image recording apparatus, developing agent supplying device, display device and method of producing electrostatic recording head. 4,977,415, Cl. 346-155.000.

Obadia, Gerard: *See—*
Bazin, Roland M.; Obadia, Gerard; Marcotte, Louis; and Scot, Jean, 4,976,272, Cl. 128-774.000.

Obara, Toshio: *See—*
Matsumoto, Yuto; Yamaga, Hiroyoshi; Akuzawa, Noboru; and Obara, Toshio, 4,977,249, Cl. 534-696.000.

Oberfrank, Martin: *See—*
Mathes, Bernhard; Gosing, Guenter; and Oberfrank, Martin, 4,976,578, Cl. 411-512.000.

Oberg, Kenneth H.: *See—*
Perdue, Thomas E., Jr.; Bransky, Jeffrey D.; Carvell, William S.; Dettloff, David E.; Ischay, Duane K.; and Oberg, Kenneth H., 4,976,373, Cl. 220-335.000.

Oberle, William L., to Rubatex Corporation. Molding method for producing expanded polyolefin foam. 4,976,902, Cl. 264-54.000.

Obradovic, Ilija J., to Emerson Electric Co. Rotor assembly and motor construction. 4,977,344, Cl. 310-217.000.

Obrecht, Gerard: *See—*
Miege, Christian; Monteil, Pierre; and Obrecht, Gerard, 4,976,534, Cl. 351-161.000.

Obuchi, Yasuji; Hamada, Akira; Akiyama, Hirokatsu; and Nakamura, Yasuhisa, to Sharp Kabushiki Kaisha. Musical score display device. 4,976,182, Cl. 84-462.000.

Occupany Safety Systems, Inc.: *See—*
Doty, Gerald A.; and Johnson, Eric T., 4,976,474, Cl. 242-107.700.

Ochiai, Kuniaki: *See—*
Shimosato, Masashi; Ochiai, Kuniaki; and Tsuyuki, Shinzi, 4,976,554, Cl. 400-124.000.

O'Connor, Chadwell. Water cooled incinerator. 4,976,208, Cl. 110-234.000.

Oda, Hiroshi: *See—*
Amano, Shigeru; Takarabe, Tsuyoshi; Oda, Hiroshi; Nakamori, Takashi; Watanabe, Satoshi; and Taira, Masamichi, 4,976,780, Cl. 75-375.000.

Oda, Kazutaka: *See—*
Ohba, Hisao; Oda, Kazutaka; Sakaki, Hirokazu; Shirai, Akira; and Ohashi, Azusa, 4,976,198, Cl. 101-459.000.

Oda, Kiyoshi: *See—*
Akashi, Shunji; and Oda, Kiyoshi, 4,976,014, Cl. 24-421.000.

Odaka, Masanori: *See—*
Miyaoka, Shuuichi; Odaka, Masanori; and Ogiue, Katsumi, 4,977,338, Cl. 307-446.000.

Odate, Seizi: *See—*
Oishi, Kengo; and Odate, Seizi, 4,977,474, Cl. 360-132.000.

Odenthal, Conrad J., to Tektronix, Inc. Electron discharge tube with bipotential electrode structure. 4,977,348, Cl. 313-479.000.

Oelschlaegel, Victor R.: *See—*
Church, John; Oelschlaegel, Victor R.; and Emery, J. Donald, 4,976,285, Cl. 137-588.000.

Oerlemans, Peter; Marrett, Rolf; Eckert, Armin; and Altfeid, Klaus. Process for increasing meso phase contents in pitch. 4,976,845, Cl. 208-39.000.

Ogasawara, Shuichi, to Sumitomo Metal Mining Company Limited. Process for removing a polyimide resin by dissolution. 4,976,808, Cl. 156-638.000.

Ogata, Hiromichi; and Yamamoto, Youichi, to Hitachi, Ltd. System recovery method for computer system having a standby system with a wait job operation capability. 4,977,500, Cl. 364-200.000.

Ogata, Teruaki; and Sudou, Yuko, to Mitsubishi Denki Kabushiki Kaisha. Apparatus for automatic preparation of measurement programs. 4,977,531, Cl. 364-580.000.

Ogawa, Akio; Shimada, Masahiko; and Ando, Kazuhiko, to Asahi Denka Kogyo K.K.; and A,C,R. Co., Ltd. Polyvinyl chloride plastisol composition. 4,977,201, Cl. 523-400.000.

Ogawa, Atsusi, to Kabushiki Kaisha Toshiba. Low driving voltage operation logic circuit. 4,977,335, Cl. 307-272.200.

Ogawa, Hisashi: *See—*
Sawada, Kazuyuki; Ogawa, Hisashi; Yano, Kohsaku; and Fujita, Tsutomu, 4,977,104, Cl. 437-162.000.

Ogawa, Ryuichi: *See—*
Suzuki, Hirohisa; Kabashima, Akira; Yamagishi, Mikio; and Ogawa, Ryuichi, 4,977,615, Cl. 455-277.000.

Ogawa, Yutaka, to Nippon Fillestar Co., Ltd. Apparatus for collecting roe and fish body processing machine using the same. 4,976,011, Cl. 452-110.000.

Ogiue, Katsumi: *See—*
Miyaoka, Shuuichi; Odaka, Masanori; and Ogiue, Katsumi, 4,977,338, Cl. 307-446.000.

Ogoda, Makoto: *See—*
Arakawa, Satoshi; Nonomura, Masamitu; Ogoda, Makoto; Torii, Shumpeita; and Kohda, Katsuhiro, 4,977,327, Cl. 250-484.100.

Ohara, Toru: *See—*
Tamekuni, Yasubiro; Amikura, Takashi; and Ohara, Toru, 4,977,457, Cl. 358-227.000.

Ohashi, Azusa: *See—*
Ohba, Hisao; Oda, Kazutaka; Sakaki, Hirokazu; Shirai, Akira; and Ohashi, Azusa, 4,976,198, Cl. 101-459.000.

Ohashi, Michihiro: *See*—
Sonoda, Yukihiro; Osawa, Kouichi; Kanai, Hiroshi; Hoshi, Kouichi; Matsuoka, Hiroki; Ohashi, Michihiro; and Sawada, Hiroshi, 4,976,242, Cl. 123-489.000.
Ohashi, Shigeo: *See*—
Nakajima, Tadakatsu; Kuwahara, Heikichi; Ohashi, Shigeo; Satoh, Motohiro; Yamada, Toshihiro; Kasai, Kenichi; Kobayashi, Satomi; and Watanabe, Akihide, 4,977,444, Cl. 357-82.000.
Ohashi, Yoshio: *See*—
Nakajima, Makoto; Ohashi, Yoshio; Chuma, Toshio; Hatori, Kazuo; Araki, Isao; Koizumi, Masahiro; Onuki, Jin; Suzuki, Hitoshi; and Okikawa, Susumu, 4,976,393, Cl. 228-111.000.
Ohba, Hisao; Oda, Kazutaka; Sakaki, Hirokazu; Shirai, Akira; and Ohashi, Azusa, to Fuji Photo Film Co., Ltd. Grain structure for lithographic printing plate supports. 4,976,198, Cl. 101-459.000.
Ohba, Noriaki; Tabata, Yujin; Nagatsuka, Masaaki; Nagatomi, Tateyuki; and Klicker, Helmut, to Nihon Surfactant Kogyo K.K. Dyeing auxiliary composition: levelling agent for reactive dyes containing hydroxy sulfonic acid anionic surfactant and poly-basic polymer. 4,976,743, Cl. 8-543.000.
Ohbayashi, Shigeki; and Asahina, Katsushi, to Mitsubishi Denki Kabushiki Kaisha. Bi-CMOS logic circuit. 4,977,337, Cl. 307-446.000.
Ohishi, Masao; Kida, Katsuaki; Ishikawa, Katsukiyo; Saito, Takao; and Nagata, Kouichi, to Nippon Paint Co., Ltd. Magnetic-shell-coated toner. 4,977,053, Cl. 430-106.600.
Ohki, Toshio: *See*—
Ichikawa, Fumihiko; and Ohki, Toshio, 4,976,149, Cl. 73-597.000.
Ohkuma, Norio: *See*—
Miyagawa, Masashi; Takenouchi, Masanori; and Ohkuma, Norio, 4,977,058, Cl. 430-138.000.
Ohkumo, Hiroya: *See*—
Miyama, Shuji; and Ohkumo, Hiroya, 4,976,139, Cl. 73-117.300.
Ohmi, Tadahiro: *See*—
Hiratsuka, Yutaka; Ohmi, Tadahiro; Murota, Junichi; Fujisaki, Yoshio; Noda, Masato; Kitada, Yoshimitsu; and Sahara, Terutaka, 4,976,815, Cl. 156-345.000.
Ohmura, Hiroshi, to Mazda Motor Corporation. Rear wheel turning system. 4,976,328, Cl. 180-140.000.
Ohnishi, Hiroshi: *See*—
Ichikawa, Yasunori; Yamaguchi, Shigeru; Ohnishi, Hiroshi; Kojima, Akira; and Kato, Akira, 4,976,404, Cl. 251-121.000.
Ohnishi, Shunichi: *See*—
Doi, Shuhei; and Ohnishi, Shunichi, 4,977,211, Cl. 525-54.310.
Ohno, Hiroyuki: *See*—
Toda, Masaaki; Ohuchida, Shuichi; and Ohno, Hiroyuki, 4,977,180, Cl. 514-423.000.
Ohno, Shigeru; Kitatani, Katsuji; Makino, Naonori; Hoshi, Satoshi; and Sato, Hideo, to Fuji Photo Film Co., Ltd. Trisazo electrophotographic photoreceptor. 4,977,051, Cl. 430-58.000.
Ohno, Takehiro; and Watanabe, Rikizo, to Hitachi Metals, Ltd. Heat resistant single crystal nickel-base super alloy. 4,976,791, Cl. 148-404.000.
Ohsawa, Michitaka: *See*—
Shiomi, Makoto; Ohsawa, Michitaka; Sakamoto, Toshiyuki; Matsumi, Kuninori; Ozeki, Kosuke; Yuki, Ikuo; and Sato, Kenji, 4,977,446, Cl. 358-60.000.
Ohshita, Katsuji, to Sailor Pen Co., Ltd., The. Mechanical pencil with a plastic chuck. 4,976,560, Cl. 401-65.000.
Ohta, Akira: *See*—
Negami, Shin'ichi; Nomachi, Hiroshi; Nemoto, Toru; Tanaka, Yoshio; and Ohta, Akira, 4,977,227, Cl. 527-400.000.
Ohta, Kazuo; and Okamoto, Tatsuaki, to Nippon Telegraph and Telephone Corporation. Method and apparatus for implementing electronic cash. 4,977,595, Cl. 380-24.000.
Ohta, Masao: *See*—
Kato, Yasuyoshi; Teshima, Nobue; Ohta, Masao; and Konishi, Kunihiko, 4,977,128, Cl. 502-328.000.
Ohta, Mitsuaki; Koide, Tokuo; Suzuki, Takeshi; Matsuhisa, Akira; Yanagisawa, Isao; and Miyata, Keiji, to Yamanouchi Pharmaceutical Co., Ltd. 4,5,6,7-tetrahydrobenzimidazole derivatives as 5HT3-antagonists. 4,977,175, Cl. 514-394.000.
Ohtagaki, Shigeki: *See*—
Hara, Mitsuhiko; Takizawa, Shozo; Tanaka, Tadao; Taniguchi, Yasutaka; Wada, Shunichi; and Ohtagaki, Shigeki, 4,977,506, Cl. 364-424.050.
Ohtani, Hideya; Momoi, Toshimitsu; Ooi, Eiji; Sakuraba, Shuhei; Morita, Masayuki; and Wakashima, Yoshiaki, to Hitachi, Ltd. Semiconductor device and tape carrier. 4,977,441, Cl. 357-70.000.
Ohtani, Mitsuaki: *See*—
Narisada, Masayuki; Ohtani, Mitsuaki; Watanabe, Fumihiko; Hagishita, Sanji; Seno, Kaoru; and Kamata, Susumu, 4,976,891, Cl. 260-401.000.
Ohtsuka, Hidefumi: *See*—
Oba, Sayoko; Muroi, Katsumi; Okuna, Kenji; Ohtsuka, Hidefumi; Iimura, Tsutomu; Kojima, Ryoji; and Kurihara, Keisuke, 4,977,415, Cl. 346-155.000.
Ohuchida, Shuichi: *See*—
Toda, Masaaki; Ohuchida, Shuichi; and Ohno, Hiroyuki, 4,977,180, Cl. 514-423.000.
Oikawa, Tetsuo: *See*—
Mori, Nobufumi; and Oikawa, Tetsuo, 4,977,321, Cl. 250-311.000.
Oil-Dri Corporation of America: *See*—
Johnson, Mark S.; Beaver, Edward; Jovanovic, Manojlo; and Chavez, Domingo, 4,976,977, Cl. 426-96.000.
Oinuma, Hitoshi; Yamanaka, Motosuke; Miyake, Kazutoshi; Hoshiko, Tomonori; Minami, Norio; and Shoji, Tadao, to Eisai Co., Ltd. Piperidine derivative and therapeutic and preventive agents for arrhythmia containing same. 4,977,165, Cl. 514-318.000.
Oishi, Kengo; and Odate, Seizi, to Fuji Photo Film Co., Ltd. Magnetic tape cartridge requiring uniform force during leader block attachment and detachment. 4,977,474, Cl. 360-132.000.
Oiwa, Yuichi: *See*—
Kawada, Kazuo; and Oiwa, Yuichi, 4,977,481, Cl. 361-287.000.
Ojima, Juji, to NHK Spring Co., Ltd. Belt or chain tensioner for power transmitting system. 4,976,661, Cl. 474-138.000.
Okada, Hiroyoshi: *See*—
Itagaki, Takaharu; Okada, Hiroyoshi; Miyake, Masao; Kobayashi, Takaaki; Tosa, Takahumi; and Satou, Hiroyuki, 4,976,976, Cl. 426-69.000.
Okada, Hisashi: *See*—
Yagihara, Morio; Okada, Hisashi; Katoh, Kazunobu; and Inoue, Nobuaki, 4,977,062, Cl. 430-264.000.
Okada, Kouichi: *See*—
Horikawa, Kazuo; Okada, Kouichi; and Miyagawa, Ichirou, 4,976,527, Cl. 350-588.000.
Okada, Shigeru: *See*—
Nakajima, Nobuyuki; Inomata, Kenichi; Okada, Shigeru; and Eitai, Kazuo, 4,976,592, Cl. 417-295.000.
Okada, Yoshikatsu: *See*—
Ishizuka, Shinichi; Suzuki, Takao; Umesato, Shoji; and Okada, Yoshikatsu, 4,976,624, Cl. 439-70.000.
Okamoto, Masaya; and Kurokawa, Hiroshi, to Idemitsu Petrochemical Co., Ltd. Polycarbonate capped with phenolic chain terminator mixture. 4,977,233, Cl. 528-198.000.
Okamoto, Tatsuaki: *See*—
Ohta, Kazuo; and Okamoto, Tatsuaki, 4,977,595, Cl. 380-24.000.
Okamoto, Tatsuo; Kotani, Hideo; Oono, Takio; Watabe, Kiyoto; Kinoshita, Yasushi; and Nishikawa, Yoshikazu, to Mitsubishi Denki Kabushiki Kaisha. Method for manufacturing interconnection structure in semiconductor device. 4,977,105, Cl. 437-190.000.
Okamura, Kenji: *See*—
Segoshi, Kazuo; Okuda, Toshiyuki; Okamura, Kenji; and Yoshida, Mizuo, 4,976,529, Cl. 351-41.000.
Okano, Susumu, to Sakae Riken Kogyo Co., Ltd. Face brightening device for use with vehicles. 4,977,487, Cl. 362-32.000.
Okawa, Takashi; Isogai, Nobuo; and Tsuji, Tomoji. Process for producing a urethane and a carbonic acid ester. 4,976,679, Cl. 560-159.000.
Okaya, Takuji: *See*—
Akazawa, Toshiyuki; Okaya, Takuji; Inoue, Takashi; and Kobayashi, Toshitaka, 4,977,212, Cl. 525-57.000.
Okazaki, Masaki; Yamamuro, Kiyohiko; Koizumi, Shigeo; and Shiba, Keisuke, to Fuji Photo Film Co., Ltd. Presensitized plate for lithography. 4,977,076, Cl. 430-583.000.
Oki Electric Industry Co., Ltd.: *See*—
Furukawa, Ryozo; Shinozaki, Keisuke; and Fukunaga, Toshiaki, 4,977,569, Cl. 372-50.000.
Kouzi, Tanagawa, 4,977,543, Cl. 365-218.000.
Oki, Yoshinari; Tanaka, Takeshi; Tuno, Ryoji; and Yoshida, Yoshihiro, to Sankyo Aluminum Industry Company Limited. Extruding die for metallic materials. 4,976,130, Cl. 72-269.000.
Okikawa, Susumu: *See*—
Nakajima, Makoto; Ohashi, Yoshio; Chuma, Toshio; Hatori, Kazuo; Araki, Isao; Koizumi, Masahiro; Onuki, Jin; Suzuki, Hitoshi; and Okikawa, Susumu, 4,976,393, Cl. 228-111.000.
Okita, Tsutomu: *See*—
Aonuma, Masashi; Okita, Tsutomu; Hashimoto, Hiroshi; and Kobayashi, Kingo, 4,976,989, Cl. 427-48.000.
Oklahoma Agricultural and Mechanical Colleges acting for and on behalf of Oklahoma State Univ., The Board of Regents for the: *See*—
Berlin, Kenneth D.; Ford, Warren T.; Rajadhyaksha, Shirish N.; Gale, Jonathan B.; and Spruce, Lyle W., 4,977,276, Cl. 549-58.000.
Okochi, Mikiyoshi; and Oshiro, Tetsuo, to NGK Spark Plug Co., Ltd. Device for measuring dynamic balance of a rotor. 4,976,147, Cl. 73-455.000.
Okuda, Hiroshi, to Mitsubishi Denki Kabushiki Kaisha. Internal combustion engine stop device. 4,976,234, Cl. 123-198.0DC.
Okuda, Hiroshi, to Mitsubishi Denki Kabushiki Kaisha. Engine ignition system. 4,976,240, Cl. 123-406.000.
Okuda, Toshiyuki: *See*—
Segoshi, Kazuo; Okuda, Toshiyuki; Okamura, Kenji; and Yoshida, Mizuo, 4,976,529, Cl. 351-41.000.
Okuhara, Masakuni; Goto, Toshio; Hori, Yasuhiro; Fujita, Takashi; Ueda, Hirotsugu; and Shigematsu, Nobuharu, to Fujisawa Pharmaceutical Co., Ltd. FR901228 substance and preparation thereof. 4,977,138, Cl. 514-10.000.
Okuna, Kenji: *See*—
Oba, Sayoko; Muroi, Katsumi; Okuna, Kenji; Ohtsuka, Hidefumi; Iimura, Tsutomu; Kojima, Ryoji; and Kurihara, Keisuke, 4,977,415, Cl. 346-155.000.
Okura, Toshihiko; Hirao, Kouji; Watanabe, Tetsuaki; and Kashihara, Kouji, to Sumitomo Electric Industries, Ltd. Tape core type coated optical fiber. 4,976,508, Cl. 350-96.230.
Oldani, Jerome L.: *See*—
Hollowed, Edward J.; and Oldani, Jerome L., 4,977,592, Cl. 379-428.000.
Oldham, Susan L.: *See*—
Dougherty, Thomas K.; Oldham, Susan L.; and Elias, William E., 4,977,220, Cl. 525-332.300.
Olikara, Philip: *See*—
Harper, Jack D.; Clayton, Richard W.; and Olikara, Philip, 4,977,408, Cl. 343-792.500.

Oliver, James D., Jr.; Biles, Kenneth A.; and Kasemset, Dumrong, to Siemens Aktiengesellschaft. Variable frequency I-V measurement system. 4,977,371, Cl. 324-158.00T.

Olm, Orville J.: *See—*
McAndless, John M.; Hancock, James R.; Barnett, Donald B.; Olm, Orville J.; Locke, Terry J. A.; and Maybank, John, 4,976,924, Cl. 422-99.000.
Phillips, Wilson C.; Germann, Anita; and Olm, Orville J., 4,976,196, Cl. 100-233.000.

O'Loughlin, Francis A., to Thomas & Betts Corporation. Grid/ground connector. 4,976,627, Cl. 439-100.000.

Olsen, Donald B.: *See—*
Holfert, John W.; and Olsen, Donald B., 4,976,729, Cl. 623-3.000.

Olympus Optical Co., Ltd.: *See—*
Chiba, Masahiro, 4,976,524, Cl. 350-432.000.
Igarashi, Tsutomu, 4,976,522, Cl. 350-426.000.
Ishii, Atsujiro; and Uzawa, Tsutomu, 4,976,521, Cl. 350-423.000.
Karaki, Koichi; Sakai, Mitsugu; and Sasaki, Yasuo, 4,977,544, Cl. 367-7.000.
Niimura, Toshinobu; Takahashi, Tadashi; Kashiba, Mutsuro; Sakai, Ko; and Kano, Tokio, 4,977,078, Cl. 435-7.000.
Yokota, Akira, 4,977,450, Cl. 358-98.000.

O'Meara, Robert J.: *See—*
Hahn, Paul; Reynolds, John; Tomlinson, Alan; O'Meara, Robert J.; and Drazba, Martin, 4,976,533, Cl. 351-160.00R.

Omron Corporation: *See—*
Fushiya, Fusao; Hayashi, Akiharu; Itsuki, Fumiaki; and Nagata, Kunio, 4,977,358, Cl. 318-268.000.

Omron Tateisi Electronics Co.: *See—*
Sawai, Kenji; Takeuchi, Tuneto; and Ito, Jinichi, 4,977,359, Cl. 318-561.000.

Omura, Takashi: *See—*
Kayane, Yutaka; Omura, Takashi; Harada, Naoki; Mori, Yasuji; Yamamoto, Yosuke; Miyamoto, Tetsuya; and Kusumoto, Takehiro, 4,977,261, Cl. 544-199.000.

Onishi, Katsumi; and Ono, Yuto, to Fujitsu Limited. Branching control system. 4,977,496, Cl. 364-200.000.

Onishi, Toshitada; Higuchi, Noboru; and Ishii, Itaru, to Agency of Industrial Science and Technology. Superconducting wire and cable. 4,977,039, Cl. 428-623.000.

Ono Pharmaceutical Co., Ltd.: *See—*
Toda, Masaaki; Ohuchida, Shuichi; and Ohno, Hiroyuki, 4,977,180, Cl. 514-423.000.

Ono, Shigetoshi: *See—*
Kanetake, Satoshi; Hashimoto, Shinichi; Ono, Shigetoshi; and Naoi, Takashi, 4,977,071, Cl. 430-534.000.

Ono, Yuto: *See—*
Onishi, Katsumi; and Ono, Yuto, 4,977,496, Cl. 364-200.000.

Onuki, Hideki; and Denda, Masaki, to Seiko Instruments Inc. Thermal line printer with staggered head segments and overlap compensation. 4,977,410, Cl. 346-76.0PH.

Onuki, Jin: *See—*
Nakajima, Makoto; Ohashi, Yoshio; Chuma, Toshio; Hatori, Kazuo; Araki, Isao; Koizumi, Masahiro; Onuki, Jin; Suzuki, Hitoshi; and Okikawa, Susumu, 4,976,393, Cl. 228-111.000.

Ooi, Eiji: *See—*
Ohtani, Hideya; Momoi, Toshimitsu; Ooi, Eiji; Sakuraba, Shuhei; Morita, Masayuki; and Wakashima, Yoshiaki, 4,977,441, Cl. 357-70.000.

Ooishi, Tsukasa: *See—*
Matsuda, Yoshio; Fujishima, Kazuyasu; Ooishi, Tsukasa; Arimoto, Kazutami; and Tsukude, Masaki, 4,977,542, Cl. 365-207.000.

Oono, Takio: *See—*
Okamoto, Tatsuo; Kotani, Hideo; Oono, Takio; Watabe, Kiyoto; Kinoshita, Yasushi; and Nishikawa, Yoshikazu, 4,977,105, Cl. 437-190.000.

Orillo, Stephen, Jr.: *See—*
Yamanouchi, Glenn T.; and Orillo, Stephen, Jr., 4,976,036, Cl. 33-23.030.

O'Rourke, Michael W.: *See—*
Sunseri, Ronald H.; and O'Rourke, Michael W., 4,977,217, Cl. 525-286.000.

Orr, Thomas V.; and Sabatelli, Anthony D., to Procter & Gamble Company, The. Skin conditioning/cleansing compositions containing propoxylated glycerol derivatives. 4,976,953, Cl. 424-47.000.

Orth, Hans: *See—*
Weisshaupt, Herbert P.; Orth, Hans; Lips, Hendrik R.; and Scheideler, Wilfried, 4,976,203, Cl. 102-476.000.

Orthodyne Electronics Corporation: *See—*
Smith, Michael C.; and Smith, Hal W., Jr., 4,976,392, Cl. 228-102.000.

Ortiz, Mark V., to Spectra-Physics, Inc. Adjustable aperture comprising a shape memory alloy and laser using same. 4,977,575, Cl. 372-103.000.

Ortmann, Wolfgang: *See—*
Scharting, Gunter; and Ortmann, Wolfgang, 4,976,551, Cl. 384-448.000.

Osawa, Kouichi: *See—*
Sonoda, Yukihiro; Osawa, Kouichi; Kanai, Hiroshi; Hoshi, Kouichi; Matsuoka, Hiroki; Ohashi, Michihiro; and Sawada, Hiroshi, 4,976,242, Cl. 123-489.000.

Oshima, Shigeru; and Takeshi, Kunio, to Canon Kabushiki Kaisha. Performance correcting optical assembly for photographic lens for television. 4,976,526, Cl. 350-463.000.

Oshiro, Gary T.; and Morisato, Rodney N. Base-point anchor. 4,976,041, Cl. 33-392.000.

Oshiro, Tetsuo: *See—*
Okochi, Mikiyoshi; and Oshiro, Tetsuo, 4,976,147, Cl. 73-455.000.

Oshiyama, Hiroaki, to Terumo Kabushiki Kaisha. Blood reservoir. 4,976,708, Cl. 604-408.000.

Otani, Kenzi; and Ito, Fimihiko, to Rohm Co., Ltd. Driver circuit for D.C. motor. 4,977,356, Cl. 318-138.000.

Otis Elevator Company: *See—*
Adrian, Willy; and Moldenhaur, Detlev B., 4,976,345, Cl. 198-323.000.

Otis Engineering Corporation: *See—*
Davis, Glenn R., 4,976,402, Cl. 251-1.300.

Otomo, Susumu: *See—*
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.

Otsuka Pharmaceutical Factory, Inc.: *See—*
Nakamura, Shizuo; Inai, Masatoshi; Inoue, Makoto; Nagao, Kazushi; and Tsuda, Yoshiaki, 4,977,179, Cl. 514-423.000.

Otsuka, Tadashi: *See—*
Matsutani, Kanji; Matsutani, Masamitsu; Otsuka, Tadashi; and Tochimura, Yoshimasa, 4,976,727, Cl. 606-223.000.

Otto, Gerhard, to C. Behrens AG. Revolving cutting press. 4,976,180, Cl. 83-133.000.

Otto, William F.: *See—*
Holloman, Miles E.; Jordan, Debbee J.; and Otto, William F., 4,976,789, Cl. 136-246.000.

Outboard Marine Corporation: *See—*
Bland, Gerald F.; Mondek, Martin J.; and Zdanowicz, Lawrence E., 4,976,640, Cl. 440-61.000.
Rawlings, David E.; and Sullivan, Donald K., 4,976,639, Cl. 440-59.000.

Ouwerkerk, Rien: *See—*
Stang, John H.; Moore, Christine H.; and Ouwerkerk, Rien, 4,976,225, Cl. 123-41.740.

Overstall, John: *See—*
Murrer, Barry A.; Overstall, John; and Willis, Peter M., 4,976,831, Cl. 204-98.000.

Owsley, Joseph L. Portable device for teaching tumbling. 4,976,623, Cl. 434-247.000.

Ozawa, Sinya; Kondo, Katsumi; and Saito, Kajin, to Showa Alumi Powder Kabushiki Kaisha. Metal powder having controlled particle size distribution for metallic pigments and process for producing the same. 4,976,777, Cl. 75-255.000.

Ozeki, Kosuke: *See—*
Shiomi, Makoto; Ohsawa, Michitaka; Sakamoto, Toshiyuki; Matsumi, Kuninori; Ozeki, Kosuke; Yuki, Ikuo; and Sato, Kenji, 4,977,446, Cl. 358-60.000.

Ozite Corporation: *See—*
Gelin, Robert J.; and Blackmore, Richard D., 4,976,290, Cl. 138-141.000.

P B Diagnostic Systems, Inc.: *See—*
Bowen, Mark S.; Fantone, Stephen D.; Miller, Bruce E.; and Thompson, Duane T., 4,977,325, Cl. 250-461.200.

P. Boer & Zn. B.V.: *See—*
Wilhelmus van Steijn, Theodorus G., 4,976,482, Cl. 294-102.100.

P.L.J. Bom Beheer B.V.: *See—*
Bom, Petrus L. J., 4,976,086, Cl. 52-741.000.

Paalman, H. Hunter: *See—*
Grinstead, Robert R.; and Paalman, H. Hunter, 4,976,866, Cl. 210-638.000.

Pacaud, Bernard; Popa, Jean-Michel; and Cartier, Claude-Bernard, to Rhone-Poulenc Chimie. Purification of silane gas. 4,976,944, Cl. 423-347.000.

Pacific Monolithics: *See—*
Podell, Allen F.; Mitchell, Scott W.; Moghe, Sanjay B.; and Ali, Fazal, 4,977,382, Cl. 333-164.000.

Paige, Clive R., to Shop-Vac Corporation. Liquid spraying nozzle. 4,976,467, Cl. 239-381.000.

Palazzola, Anthony. Adjustable cam. 4,976,070, Cl. 51-101.00R.

Palencher, Jacques, to Radio Controle, S.A. Ferromagnetic measuring apparatus. 4,977,369, Cl. 324-154.0PB.

Paliard, Maurice; Martin, Jean-Marc; Cochet, Francis; and Valdelievre, Benoit, to CLE. Method of crushing and compacting any mineral material whatsoever and system for carrying out this method. 4,976,469, Cl. 241-24.000.

Pall Corporation: *See—*
Matkovich, Vlado I., 4,976,926, Cl. 422-101.000.
Pall, David B., 4,976,861, Cl. 210-508.000.

Pall, David B., to Pall Corporation. Method for determining the wetting characteristic of a porous medium. 4,976,861, Cl. 210-508.000.

Palmacci, Jed. Ice bag holding device. 4,976,262, Cl. 128-402.000.

Paloma Kogyo Kabushiki Kaisha: *See—*
Nishino, Hiroshi, 4,976,604, Cl. 431-1.000.

Pankove, Jacques I., to University of Colorado Foundation, Inc. Optoelectronic semiconductor device. 4,977,433, Cl. 357-16.000.

Pantucek, Anton. Frictional exerciser with temperature indicating structure. 4,976,427, Cl. 272-131.000.

Pappas, S. Peter: *See—*
Gottschalk, Peter; Neckers, Douglas C.; Schuster, Gary B.; Adair, Paul C.; and Pappas, S. Peter, 4,977,511, Cl. 364-473.000.

Parins, David J.; Rydell, Mark A.; and Stasz, Peter, to Everest Medical Corporation. Ablation catheter with selectively deployable electrodes. 4,976,711, Cl. 606-48.000.

Park, Chung-Ho: *See*—
Brittelli, David R.; Corless, Peter F.; Gregory, Walter A.; and Park, Chung-Ho, 4,977,173, Cl. 514-376.000.

Park, Daniel J.: *See*—
Price, Gary A.; Park, Daniel J.; and Gehring, Mark R., 4,977,399, Cl. 340-825.440.

Park, Heung Jong. Contact protecting and alarming device for a vehicle. 4,977,388, Cl. 340-436.000.

Parker Hannifin Corporation: *See*—
Church, John; Oelschlaegel, Victor R.; and Emery, J. Donald, 4,976,285, Cl. 137-588.000.

Parker, Robert P.: *See*—
Rodriguez-Cavazos, Enrique; Altmanshofer, Robert D.; Parker, Robert P.; and Hall, Estill T., Jr., 4,977,355, Cl. 315-368.000.

Parker, Roger A.; and Sunkara, Sai P., to Merrell Dow Pharmaceuticals. Antiretroviral aryloxy substituted furan ketones. 4,977,185, Cl. 514-473.000.

Parl, Fritz F.; Bradley, Charles A.; Benge, Herman; and Black, David L., to Vanderbilt University. Apparatus for continuously sampling plasma. 4,976,270, Cl. 128-760.000.

Parschat, Lothar: *See*—
Pleschiutschnigg, Fritz-Peter; Parschat, Lothar; Burau, Armin; Rahmfeld, Werner; Moellers, Gerd; Ehrenberg, Hans-Juergen; and Eberhardt, Hans G., 4,976,306, Cl. 164-476.000.

Parsi, Edgardo J.: *See*—
Goldstein, Arthur J.; and Parsi, Edgardo J., 4,977,094, Cl. 436-157.000.

Pascouet, Adrien P. Method for reshaping acoustical pressure pulses. 4,976,333, Cl. 181-115.000.

Passerieux, Robert: *See*—
Merigaud, Bernard; Claus, Michel; and Passerieux, Robert, 4,977,302, Cl. 219-10.55E.

Pastureau, Nicole: *See*—
Rousseau, Gerard; and Pastureau, Nicole, 4,976,899, Cl. 264-29.500.

Patail Enterprises, Inc.: *See*—
Tacquard, Timothy L.; and Gillfillan, Patricia B., 4,976,620, Cl. 434-81.000.

Pataki, Steven: *See*—
Bay, Peter M.; Colaluca, Carmine J., Jr.; and Pataki, Steven, 4,976,399, Cl. 244-161.000.

Patel, Mansukh M.; Chisari, Paul R.; and Broderick, Kevin B., to Wm. Wrigley Jr. Company. Chewing gum with improved sweetness employing xylitol rolling compound. 4,976,972, Cl. 426-3.000.

Patsiokas, Stelios J.: *See*—
Johnson, Brian K. A.; and Patsiokas, Stelios J., 4,977,589, Cl. 379-58.000.

Patterson, James; and Patterson, Julia H. Portable shower stall. 4,975,992, Cl. 4-599.000.

Patterson, Julia H.: *See*—
Patterson, James; and Patterson, Julia H., 4,975,992, Cl. 4-599.000.

Patz, Vivian E.: *See*—
Beukes, Christo A.; Patz, Vivian E.; and Moraitis, Thrasyvoulas, 4,976,199, Cl. 102-200.000.

Pauli, Ingo; Kleinschmit, Peter; and Schwarz, Rudolf, to Degussa Aktiengesellschaft. Spherical, hydrophilic silica, method of its preparation and use. 4,976,943, Cl. 423-336.000.

Paulson, Leland E., to United States of America, Energy. Method for producing H_2 using a rotating drum reactor with a pulse jet heat source. 4,976,940, Cl. 423-648.100.

Pavlath, George A. Methods for rugged attachment of fibers to integrated optics chips and product thereof. 4,976,506, Cl. 350-96.170.

Pawate, Basavaraj I.: *See*—
Doddington, George R.; and Pawate, Basavaraj I., 4,977,598, Cl. 381-43.000.

Pearlman, Bruce A.: *See*—
Livingston, Douglas A.; Pearlman, Bruce A.; and Denmark, Scott, 4,977,255, Cl. 540-4.000.

Pearson, Robert C. Article display. 4,976,357, Cl. 211-13.000.

Pease Industries, Inc.: *See*—
Doolan, Martin P.; Duvall, Dale R.; Guetle, Norbert J., Jr.; and Rajagopol, Ganesh, 4,976,122, Cl. 70-134.000.

Pease, Mark E.: *See*—
Volz, Le Roy A.; and Pease, Mark E., 4,977,472, Cl. 360-78.140.

PEC Research, Inc.: *See*—
Stearns, Donald M., 4,976,863, Cl. 210-608.000.

Peck, Robert E.: *See*—
Tong, Timothy W.; Sathe, Sanjeev B.; and Peck, Robert E., 4,977,111, Cl. 501-95.000.

Peckels, Arganius E. Funnel having improved liquid fill level indicator. 4,976,297, Cl. 141-95.000.

Peiming, Huang: *See*—
Koulin, Ge; Yunzhu, Wang; Xunmei, Yuan; and Peiming, Huang, 4,977,087, Cl. 435-240.470.

Pelizzari, Charles A.; and Chen, George T. Y., to Arch Development Corporation; and University of Chicago, The. Means to correlate images from scans taken at different times including means to determine the minimum distances between a patient anatomical contour and a correlating surface. 4,977,505, Cl. 364-413.190.

Pellet, Regis J.: *See*—
Long, Gary N.; Pellet, Regis J.; and Rabo, Jule A., 4,976,846, Cl. 208-114.000.

Peloquin, Perry M.: *See*—
Decker, James D.; Burch, Wendell D.; Brady, Daniel F.; Hinzman, Gary W.; Kromrey, Edward P.; Sanville, Katherine M.; Southworth, Donald R.; Chace, Mark S.; and Peloquin, Perry M., 4,976,137, Cl. 73-53.000.

Pepe, David, to Davis Electric Wallingford Corporation. Apparatus for extruding a sheath of synthetic material around a conductor and for changing the color of same. 4,976,599, Cl. 425-131.100.

Pepe, Martin J., to Xerox Corporation. Electronic color printing system. 4,977,411, Cl. 346-108.000.

Perales, Kenneth L., to Baroid Technology, Inc. Borehole pressure and temperature measurement system. 4,976,142, Cl. 73-155.000.

Perdue, Thomas E., Jr.; Bransky, Jeffrey D.; Carvell, William S.; Dettloff, David E.; Ischay, Duane K.; and Oberg, Kenneth H., to ACCO World Corporation. Suspendable hinged lockable lid storage box. 4,976,373, Cl. 220-335.000.

Perez-Ruiz, Jose-Maria; and Mendoza-Mendoza, Andres, to Crouzet (Societe Anonyme francaise). Double action switch. 4,977,299, Cl. 200-5.00B.

Perkin Elmer Corporation, The: *See*—
McKinley, Kerry; and Twombly, Benjamin, 4,976,152, Cl. 73-852.000.

Perotto, Christian, to S.N.C. Livbag. Solid gas-generating composition and its use in gas generators for inflatable cushions intended to protect the passengers of a motor vehicle. 4,976,795, Cl. 149-19.400.

Perov, Anatoly V.: *See*—
Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A., 4,976,322, Cl. 175-57.000.

Perretta, Louis A. Electronic component storage album. 4,977,483, Cl. 361-424.000.

Perry, Arthur C. Device for orbital implant. 4,976,731, Cl. 623-4.000.

Pertchik, S. Roy: *See*—
Kaveckis, Joseph E.; and Pertchik, S. Roy, 4,976,075, Cl. 52-71.000.

Pessi, Antonello: *See*—
Nuzzolo, Carlo A.; Bernardi, Adriano; Pessi, Antonello; and Verdini, Antonio S., 4,977,079, Cl. 435-7.000.

Petersheim, Enos: *See*—
Mish, Joseph E.; and Petersheim, Enos, 4,976,040, Cl. 33-372.000.

Peterson, Alan D. Bathtub seat apparatus. 4,975,991, Cl. 4-579.000.

Petrie, Adelore F.: *See*—
Babico, John Y.; and Petrie, Adelore F., 4,977,477, Cl. 361-98.000.

Petrofsky, Steven H., to Therapeutic Technologies Inc. Power muscle stimulator. 4,976,264, Cl. 128-421.000.

Peukert, Eberhard: *See*—
Jeromin, Lutz; Peukert, Eberhard; Gutsche, Bernhard; Wollmann, Gerhard; and Schleper, Bernard, 4,976,892, Cl. 260-410.700.

Pfister, Steven R.: *See*—
Buckley, Clifford J.; and Pfister, Steven R., 4,976,406, Cl. 280-641.000.

Pfitzenmaier, Robert W.: *See*—
Amundson, W. Duane, Jr.; Boek, Heather; Hares, George B.; and Pfitzenmaier, Robert W., 4,977,110, Cl. 501-7.000.

Pfizer Inc.: *See*—
Howard, Harry R., Jr.; and Sarges, Reinhard, 4,977,178, Cl. 514-418.000.

Pharmedix: *See*—
Mangini, Richard J.; and Hartig, William J., 4,976,351, Cl. 206-232.000.

Phelps, Frankie E.; and Leech, Gerald W., to Aluminum Company of America. Process for producing silicon aluminum oxynitride by carbothermic reaction. 4,977,113, Cl. 501-98.000.

Phillips, Edward H.; and Johannsmeier, Karl-Heinz, to Eaton Corporation. X-Y addressable workpiece positioner and mask aligner using same. 4,977,361, Cl. 318-640.000.

Phillips, Wilson C.; Germann, Anita; and Olm, Orville J., to Wita Products Limited. Compaction of aluminum beverage cans. 4,976,196, Cl. 100-233.000.

Philo, Alfred D.: *See*—
Wuepper, Thomas E.; Grauherr, Keith R.; Tate, Orren R.; and Philo, Alfred D., 4,976,303, Cl. 164-29.000.

Photonics Corporation: *See*—
Allen, Richard C., 4,977,618, Cl. 455-607.000.

Phung, Van P. T.; and Kositpaiboon, Rungroj, to Northern Telecom Limited. Method of providing effective priority access in a dual bus system. 4,977,557, Cl. 370-85.600.

Physiomed-Medizintechnik GmbH: *See*—
Seidl, Hans; Walder, Wolfgang; and Reinhold, Walter, 4,976,263, Cl. 128-421.000.

Picheny, Michael A.: *See*—
Bahl, Lalit R.; DeSouza, Peter V.; Mercer, Robert L.; and Picheny, Michael A., 4,977,599, Cl. 381-43.000.

Pierce, Wesley L., to Pierce, Wesley L.; and Saul, Donna E. Adjustable animal feeding apparatus. 4,976,223, Cl. 119-61.000.

Pierson, Lyndon G.: *See*—
Maestas, Joseph H.; and Pierson, Lyndon G., 4,977,596, Cl. 380-48.000.

Piggin, Peter R., to Erithglen Limited. Furnaces for incinerating waste material. 4,976,209, Cl. 110-234.000.

Pioneer Electronic Corporation: *See*—
Hangai, Toshimasa; Ishitoya, Koichi; and Tagawa, Akihiko, 4,977,554, Cl. 369-215.000.
Murata, Yasushi; and Tanaka, Satoru, 4,976,514, Cl. 350-345.000.
Murata, Yasushi, 4,977,326, Cl. 250-483.100.
Sui, Masahiro, 4,977,465, Cl. 360-33.100.
Yokogawa, Fumihiko, 4,977,553, Cl. 369-44.260.
Yokozawa, Seiichi, 4,977,469, Cl. 360-77.010.

Pipe Line Development Company, The: *See*—
Rogers, Elmer V., Jr., 4,976,372, Cl. 222-324.000.

Pitchford, Gary; Pitchford, Steve; and Hyde, Paul, to Campsport, Inc. Personal multi-purpose navigational apparatus and method for operation thereof. 4,977,509, Cl. 364-449.000.

Pitchford, Steve: *See—*
Pitchford, Gary; Pitchford, Steve; and Hyde, Paul, 4,977,509, Cl. 364-449.000.

Pitman-Moore, Inc.: *See—*
Schricker, Brian R.; and Mehrotra, Vikram P., 4,976,963, Cl. 424-438.000.

Pitney Bowes Inc.: *See—*
Bartoes, Robert J.; and Wirth, Eugene A., 4,976,419, Cl. 270-45.000.

Pizzino, Edward. Method of forming footing and laying first course of block. 4,976,087, Cl. 52-742.000.

Plamondon, Marc. Ophthalmic solution comprising iodine-polyvinylpyrrolidone complex. 4,976,969, Cl. 424-672.000.

Plas/Steel Products, Inc.: *See—*
Shobert, James P., 4,976,550, Cl. 384-298.000.

Plattner, Jacob J.: *See—*
Rosenberg, Saul H.; Luly, Jay R.; and Plattner, Jacob J., 4,977,277, Cl. 549-215.000.

Pleschiutschnigg, Fritz-Peter; Parschat, Lothar; Burau, Armin; Rahmfeld, Werner; Moellers, Gerd; Ehrenberg, Hans-Juergen; and Eberhardt, Hans G., to Mannesmann AG. Combined continuous casting and rolling. 4,976,306, Cl. 164-476.000.

Pleva, Robert M.; and Randall, Martin, to Chips and Technologies, Incorporated. Color to monochrome conversion. 4,977,398, Cl. 340-793.000.

Ploog, Uwe: *See—*
Uphues, Guenter; Ploog, Uwe; Becker, Wolfgang; and Goebel, Irmhild, 4,977,294, Cl. 558-208.000.

Plummer, David D.; and Ginnow-Merkert, Hartmut, to Andersen Corporation. Sliding window apparatus and method. 4,976,066, Cl. 49-225.000.

Pocock, John F. E.: *See—*
Krishnakumar, Suppayan M.; Friendship, Kenneth F. M.; Mahajan, Gautam K.; and Pocock, John F. E., 4,977,005, Cl. 428-36.920.

Podell, Allen F.; Mitchell, Scott W.; Moghe, Sanjay B.; and Ali, Fazal, to Pacific Monolithics. Vector modulator phase shifter. 4,977,382, Cl. 333-164.000.

Pogany, Stefano A.: *See—*
McClelland, Gregory A.; Zentner, Gaylen M.; and Pogany, Stefano A., 4,976,967, Cl. 424-473.000.

Poggi, Tatjana: *See—*
Krakkay, Tibor; Poggi, Tatjana; and Schubert, Ernst, 4,977,225, Cl. 526-93.000.

Pohl, Peter, to CDI consolidated devices inc. Instrument for adjusting and calibrating torque wrenches. 4,976,133, Cl. 73-1.00C.

Pohlenz, Hans; and Wagner, Gunter, to Stabilus GmbH. Racket, and more particularly a tennis racket. 4,976,433, Cl. 273-73.00E.

Polan, George S., to Central Sprinkler Corporation. Concealed sprinkler with drop down deflector assembly, and improved fusible valve lever assembly. 4,976,320, Cl. 169-39.000.

Polaroid Corporation: *See—*
Bleszinski, Walter, Jr.; and Bruder, Alan H., 4,977,046, Cl. 429-194.000.

Pollak, Stanley B.: *See—*
Blasnik, William; and Pollak, Stanley B., 4,976,721, Cl. 606-157.000.

Polley, Robert F. L. Forward recumbent posture pod. 4,976,494, Cl. 297-464.000.

Ponpipom, Mitree M.: *See—*
Biftu, Tesfaye; Ponpipom, Mitree M.; and Girotra, Nirindar N., 4,977,146, Cl. 514-99.000.

Pool, Richard b. Fishing lure. 4,976,061, Cl. 43-44.600.

Popa, Jean-Michel: *See—*
Pacaud, Bernard; Popa, Jean-Michel; and Cartier, Claude-Bernard, 4,976,944, Cl. 423-347.000.

Popadiuk, Nicholas M.: *See—*
Dorband, Glen C.; Liland, Alfred; Menezes, Edgar; Steinheuser, Peter; Popadiuk, Nicholas M.; and Failla, Stephen J., 4,976,909, Cl. 264-235.000.

Pope, Peter E., to Portals Engineering Limited. Filling machines. 4,976,296, Cl. 141-46.000.

Popp, Franz W.: *See—*
Madle, Wolfgang; Gawlik, Norbert; and Popp, Franz W., 4,976,912, Cl. 376-249.000.

Popper, Peter: *See—*
McConnell, Ronald F.; and Popper, Peter, 4,976,812, Cl. 156-148.000.

Porcher, Alain R.; and Martin, Jean-Claude, to Allflex Europe S.A. Appliance designed for single use for taking samples of liquids. 4,976,925, Cl. 422-100.000.

Portals Engineering Limited: *See—*
Pope, Peter E., 4,976,296, Cl. 141-46.000.

Porter, Bryan K.; Jakubiak, Marvin J.; and Bott, Jerry A., to Automatic Inspection Systems, Inc. Automatic bottle bagger. 4,976,090, Cl. 53-448.000.

Post, Charles C.; and Swartz, Roger E., to Motor Wheel Corporation. Vehicle wheel construction. 4,976,497, Cl. 301-37.00R.

Postle, Stephen R.: *See—*
Ashford, Neil F.; Hodgson, Alan; Blum, Peter M.; and Postle, Stephen R., 4,977,047, Cl. 430-2.000.

Potlatch Corporation: *See—*
Minton, Mary L., 4,976,819, Cl. 162-9.000.

Potvin, Michael J., to Kansas Power and Light Company, The. Modified gas gauge. 4,976,134, Cl. 73-3.000.

Powell, Robert C., to Lucas Weinschel Inc. High frequency power sensing device. 4,977,366, Cl. 324-95.000.

Powell, William E., to Alcatel NA, Inc.,. Contact status detector. 4,977,478, Cl. 361-160.000.

Power Solutions, Inc.: *See—*
LaPalme, Stephen G., 4,977,513, Cl. 364-483.000.

Powers, John W. Method for construction of an in-ground swimming pool. 4,976,088, Cl. 52-742.000.

Prado, Gilles: *See—*
Richard, Robert; and Prado, Gilles, 4,976,207, Cl. 110-214.000.

President and Fellows of Harvard College: *See—*
Kassis, Amin I.; and Khawli, Leslie A., 4,977,288, Cl. 556-87.000.

Prevent-A-Crime International, Inc.: *See—*
Jack, David E., 4,976,456, Cl. 283-70.000.

Previdoli, Felix: *See—*
Mills, Lester; and Previdoli, Felix, 4,977,264, Cl. 544-334.000.

Price, Gary A.; Park, Daniel J.; and Gehring, Mark R., to AT&E Corporation. Mobile radio paging test system. 4,977,399, Cl. 340-825.440.

Prinsloo, Willem J. C.; de Villiers, Pierre; and van Dijken, Marten C., to Cyclofil (Proprietary) Limited. Vortex tube separating device. 4,976,748, Cl. 55-1.000.

Pritzl, Werner: *See—*
Bicz, Wieslaw, 4,977,601, Cl. 382-4.000.

Procter & Gamble Company, The: *See—*
Coffindaffer, Timothy W., 4,976,878, Cl. 252-8.600.
Maldonado, Rene; Trinh, Toan; and Gosselink, Eugene P., 4,976,879, Cl. 252-8.700.
Orr, Thomas V.; and Sabatelli, Anthony D., 4,976,953, Cl. 424-47.000.

Pruehs, Allen V.: *See—*
Langdon, Albert K.; Learmont, Robert O.; Robinson, Darrell; Goozen, Robert; Lewis, Michael; Williams, John; Pruehs, Allen V.; and Shincovich, John T., 4,977,482, Cl. 361-366.000.

Prukop, Gabriel; and Chea, Chhiv K., to Texaco Inc. Use of taurine additives in enhanced oil recovery with anionic surfactants. 4,976,315, Cl. 166-270.000.

Przedsiebiorstwo Polonijno-Zagraniczne Plastomed: *See—*
Czernecki, Andrzej; and Cippert, Piotr, 4,976,161, Cl. 73-864.170.

Psicom Sports Incorporated: *See—*
Rudnick, Paul J.; Toldalagi, Paul M.; and Neff, Harlan, 4,977,503, Cl. 364-410.000.

Puckeridge, Larry: *See—*
Helal, Mohammed A.; and Puckeridge, Larry, 4,977,353, Cl. 315-130.000.

Purcell, Alexander M., to Summagraphics Corporation. Liquid crystal position determining system and wand device. 4,977,315, Cl. 250-221.000.

Purdue Research Foundation: *See—*
Kleber, Carl J.; and Putt, Mark S., 4,976,954, Cl. 424-52.000.

Putman, Richard E.: *See—*
Gregg, Gerald L.; Putman, Richard E.; and Gomola, John W., 4,977,529, Cl. 364-578.000.

Putt, Mark S.: *See—*
Kleber, Carl J.; and Putt, Mark S., 4,976,954, Cl. 424-52.000.

Quam, Roger C., to Waste-Not, Inc. Wastebasket divider. 4,976,375, Cl. 220-534.000.

Quanta Computer Inc.: *See—*
Lam, Pak-Lee, 4,976,007, Cl. 16-302.000.

Questek, Inc.: *See—*
Bittenson, Steven N.; and Klauminzer, Gary K., 4,977,573, Cl. 372-81.000.

Quintero, Lirio: *See—*
Rodriguez, Domingo; Quintero, Lirio; Terrer, Maria T.; Jimenez, Euler; Silva, Felix; and Salazar, Jose, 4,976,745, Cl. 44-301.000.

R. J. Reynolds Tobacco Company: *See—*
McConnell, Bain C.; Jarvis, William R.; Demey, C. Fred, III; and Maddrey, James G., Jr., 4,976,326, Cl. 177-145.000.

Raatz, Francis: *See—*
Dufresne, Pierre; Franck, Jean-Pierre; Raatz, Francis; and Travers, Christine, 4,977,121, Cl. 502-66.000.

Rabo, Jule A.: *See—*
Long, Gary N.; Pellet, Regis J.; and Rabo, Jule A., 4,976,846, Cl. 208-114.000.

Radio Controle, S.A.: *See—*
Palencher, Jacques, 4,977,369, Cl. 324-154.0PB.

Rahmfeld, Werner: *See—*
Pleschiutschnigg, Fritz-Peter; Parschat, Lothar; Burau, Armin; Rahmfeld, Werner; Moellers, Gerd; Ehrenberg, Hans-Juergen; and Eberhardt, Hans G., 4,976,306, Cl. 164-476.000.

Rajadhyaksha, Shirish N.: *See—*
Berlin, Kenneth D.; Ford, Warren T.; Rajadhyaksha, Shirish N.; Gale, Jonathan B.; and Spruce, Lyle W., 4,977,276, Cl. 549-58.000.

Rajagopol, Ganesh: *See—*
Doolan, Martin P.; Duvall, Dale R.; Guetle, Norbert J., Jr.; and Rajagopol, Ganesh, 4,976,122, Cl. 70-134.000.

Ramos, Frank; and Lee, Robert T. Collapsible car window canopy apparatus. 4,976,487, Cl. 296-152.000.

Randall, Martin: *See—*
Pleva, Robert M.; and Randall, Martin, 4,977,398, Cl. 340-793.000.

Ranford, Alan B.: *See—*
Bodicky, Raymond O.; and Ranford, Alan B., 4,976,707, Cl. 604-408.000.

Rao, Balbir S.: *See*—
Holloway, Brian R.; Howe, Raiph; Rao, Balbir S.; and Stribling, Donald, 4,977,148, Cl. 514-183.000.
Rao, Nancy A.; and Hickner, Richard A., to Dow Chemical Company, The. Cationic, advanced epoxy resin compositions from (1) diglycidyl ethers of phenols (2) diglycidyl ethers of alkane diols and (3) dihydric phenols. 4,977,202, Cl. 523-414.000.
Rapp, Knut: *See*—
Leupold, Ernst I.; Wiesner, Matthias; Schlingmann, Merten; and Rapp, Knut, 4,977,283, Cl. 549-484.000.
Rasmussen, Chris W.: *See*—
Nieto, Robert L.; and Rasmussen, Chris W., 4,976,724, Cl. 606-182.000.
Rastegar, Joseph; and Valiton, Anne S., to Digital Equipment Corporation. Data processing system having a data memory interlock coherency scheme. 4,977,498, Cl. 364-200.000.
Rastergraphics, Inc.: *See*—
Bibl, Andreas; and Fellingham, George, 4,977,416, Cl. 346-155.000.
Rathbone, Charles S., to Champion International Corporation. Two-part carton with carrying handle. 4,976,394, Cl. 229-117.140.
Rathi, Ronald J.; and Benson, Lewis B., to Dravo Lime Company. Flue gas desulfurization with oxidation of calcium sulfite in FGD discharges. 4,976,936, Cl. 423-242.000.
Rathman, Terry L.: *See*—
Morrison, Robert C.; and Rathman, Terry L., 4,976,886, Cl. 252-182.300.
Rawlings, David E.; and Sullivan, Donald K., to Outboard Marine Corporation. Power steering mechanism for marine installations. 4,976,639, Cl. 440-59.000.
Ray, Michael A., to Borden, Inc. Slip-on face shield. 4,975,981, Cl. 2-10.000.
Raybould, Torquil J. G.; and Takahashi, Miyoko, to Adi Diagnostics, Inc. Stable rabbit-mouse hybridomas and secretion products thereof. 4,977,081, Cl. 435-70.210.
Raymond Engineering Inc.: *See*—
Snyder, Robert F.; Ferguson, John H.; Meisterling, Jesse R.; and Fishman, David S., 4,976,159, Cl. 73-862.210.
Raytheon Company: *See*—
Adamski, Joseph R.; and Sklenak, John S., 4,976,749, Cl. 55-6.000.
Chin, Tim; and Kohlman, Susan D., 4,977,295, Cl. 174-35.0GC.
Razgaitis, Richard: *See*—
Maringer, Robert E.; Nack, Herman; and Razgaitis, Richard, 4,976,934, Cl. 423-210.000.
RCA Licensing Corportion: *See*—
Rodriguez-Cavazos, Enrique; Altmanshofer, Robert D.; Parker, Robert P.; and Hall, Estill T., Jr., 4,977,355, Cl. 315-368.000.
Re, Alberto: *See*—
Bargigia, Gianangelo; Re, Alberto; Corbelli, Luigi; Johns, Ken; Flabbi, Luciano; and Srinivasan, Padmanabhan, 4,977,222, Cl. 525-359.300.
Reasons, Rob: *See*—
Sargeant, Bruce A.; Hoffenberg, Mark J.; Reasons, Rob; and Walpert, Robert A., 4,976,424, Cl. 272-73.000.
Redkin, Vladimir F.: *See*—
Kozlov, Vladimir I.; Redkin, Vladimir F.; Kozyrev, Sergei A.; Borisov, Vasily N.; Boldyrev, Vladimir V.; Krebel, Fedor R.; and Rubtsov, Nikolai M., 4,976,472, Cl. 241-172.000.
Reed, Bradley W.: *See*—
Callahan, Robert W.; and Reed, Bradley W., 4,976,867, Cl. 210-637.000.
Reichardt, Manfred: *See*—
Schuder, Bernd; and Reichardt, Manfred, 4,976,630, Cl. 439-260.000.
Reichelt, Wolfgang, to Sig Schweitzerische Industrie-Gesellschaft. Packing apparatus with defective wrapper sheet eliminating means and method. 4,976,089, Cl. 53-53.000.
Reichenberger, Helmut; Naser, Georg; and Schmidt, Erhard, to Siemens Aktiengesellschaft. Apparatus for extracorporeal lithotripsy using shock waves and therapeutic ultrasound. 4,976,255, Cl. 128-24.00A.
Reid, Roy C., to Altank Industries Ltd. Support system for vacuum insulated cylindrical cryogenic vessels. 4,976,110, Cl. 62-45.100.
Reihl, Peter: *See*—
Stickel, Heinz; and Reihl, Peter, 4,976,358, Cl. 211-41.000.
Reime, Gerd: *See*—
Durst, Klaus; and Reime, Gerd, 4,977,404, Cl. 341-176.000.
Rein, Gary, to Brown & Williamson Tobacco Corporation. Clock security device. 4,977,548, Cl. 368-10.000.
Reinhardt, Lloyd C. Boat launching system. 4,976,211, Cl. 114-44.000.
Reinhold, Walter: *See*—
Seidl, Hans; Walder, Wolfgang; and Reinhold, Walter, 4,976,263, Cl. 128-421.000.
Reis, Kathleen J.: *See*—
Boyle, Michael D. P.; and Reis, Kathleen J., 4,977,082, Cl. 435-71.100.
Reis, Werner, to G. Rodenstock Instrumente GmbH. Endothelvorsatz. 4,976,535, Cl. 351-214.000.
Rekers, John W.: *See*—
Miley, John W.; and Rekers, John W., 4,977,281, Cl. 549-373.000.
Reliance Electric Company: *See*—
Carmichael, Keith L.; and Runyan, James F., 4,976,186, Cl. 91-166.000.
Renault, Christian: *See*—
Hardy, Jean-Claude; and Renault, Christian, 4,977,166, Cl. 514-323.000.
Renfert GmbH & Co.: *See*—
Klaus-Ulfert, Rieger, 4,976,073, Cl. 51-410.000.
Renner, Gunter; and Matejec, Reinhart, to Agfa-Gevaert Aktiengesellschaft. Color photographic recording material containing color couplers. 4,977,072, Cl. 430-549.000.
Research Development Corp. of Japan: *See*—
Kumaki, Jiro, 4,977,242, Cl. 528-499.000.
Research and Education Institute, Inc.: *See*—
Leake, Donald, 4,976,737, Cl. 623-16.000.
Research Foundation of State University of New York, The: *See*—
Blasnik, William; and Pollak, Stanley B., 4,976,721, Cl. 606-157.000.
Resneau, Patrick: *See*—
Delagebeaudeuf, Daniel; Derewonko, Henri; Godart, Jean J.; Resneau, Patrick; and Gibeau, Pierre, 4,977,434, Cl. 357-22.000.
Reutter, Anneliese: *See*—
Haberle, Norman; and Reutter, Anneliese, 4,977,183, Cl. 514-425.000.
Revolutionary Adhesive Materials, Ltd.: *See*—
Smith, Hylton H.; and Foggin, Richard G., 4,977,006, Cl. 428-42.000.
Reynolds, John: *See*—
Hahn, Paul; Reynolds, John; Tomlinson, Alan; O'Meara, Robert J.; and Drazba, Martin, 4,976,533, Cl. 351-160.00R.
Rheinmetall GmbH: *See*—
Weisshaupt, Herbert P.; Orth, Hans; Lips, Hendrik R.; and Scheideler, Wilfried, 4,976,203, Cl. 102-476.000.
Rhode Island Hospital: *See*—
Lipsky, Milton H.; and Rosner, Andrew, 4,976,923, Cl. 422-58.000.
Rhone-Poulenc Chimie: *See*—
Pacaud, Bernard; Popa, Jean-Michel; and Cartier, Claude-Bernard, 4,976,944, Cl. 423-347.000.
Rhone-Poulenc Films: *See*—
Grosjean, Pierre, 4,977,032, Cl. 428-483.000.
Rhone-Poulenc Sante: *See*—
Hardy, Jean-Claude; and Renault, Christian, 4,977,166, Cl. 514-323.000.
Rhone-Poulenc Specialites Chimiques: *See*—
Fabre, Frederic; Tognet, Jean-Paul; and Magnier, Claude, 4,976,939, Cl. 423-21.100.
Giroud-Abel, Bruno; and Goletto, Jean, 4,977,213, Cl. 525-66.000.
Riba, Jean-Pierre: *See*—
Sanchez, Victor; Biscans, Beatrice; Couderc, Jean-Pierre; and Riba, Jean-Pierre, 4,976,865, Cl. 210-635.000.
Ricco, Antonio J.: *See*—
Huffman, Dennis D.; Hughes, Robert C.; Kelsey, Charles A.; Lane, Richard; Ricco, Antonio J.; Snelling, Jay B.; and Zipperian, Thomas E., 4,976,266, Cl. 128-659.000.
Richard, Robert; and Prado, Gilles, to Fondis, S.A. Process of improved postcombustion with rapid triggering and means for implementation in a heating and incineration device. 4,976,207, Cl. 110-214.000.
Richards, Robert L., to Amoco Corporation. Seal and seal assembly. 4,976,444, Cl. 277-53.000.
Riches, Arthur J.; and Andrews, Derek, to Amphenol Corporation. Data bus contact. 4,976,632, Cl. 439-580.000.
Richter, Johan C. F. C.; and Richter, Ole J., to Kamyr AB. Pump with separate fluidizing vaned shaft adjacent impeller. 4,976,586, Cl. 415-143.000.
Richter, Karl M.; and Vecsei, Vilmos, to Howmedica International, Inc. Locking nail. 4,976,258, Cl. 606-64.000.
Richter, Ole J.: *See*—
Richter, Johan C. F. C.; and Richter, Ole J., 4,976,586, Cl. 415-143.000.
Ricoh Company, Ltd.: *See*—
Chang, Hershow; Kim, Seong; and Motoyama, Tetsuro, 4,977,519, Cl. 364-519.000.
Fukuda, Shigeru, 4,977,463, Cl. 358-448.000.
Gotoh, Hiroshi, 4,977,552, Cl. 369-44.140.
Hotta, Yoshihiko; and Kubo, Keishi, 4,977,030, Cl. 428-447.000.
Ino, Masumitsu; Kohata, Mitsuhiro; Itagaki, Masanori; Nagata, Takehito; and Tanaka, Hiroyuki, 4,977,304, Cl. 250-208.100.
Kanaya, Koichi, 4,976,421, Cl. 271-258.000.
Shimada, Kazuyuki; Niito, Yoshiharu; Kiya, Yikitoshi; Yagishita, Takahiro; Miyamoto, Masayoshi; Azumai, Hideo; and Iwasaki, Keiichi, 4,977,414, Cl. 346-154.000.
Soga, Setsuo, 4,977,308, Cl. 219-469.000.
Tani, Tatsuo; and Watanabe, Mutsuo, 4,977,429, Cl. 355-260.000.
Ricoh Corporation: *See*—
Chang, Hershow; Kim, Seong; and Motoyama, Tetsuro, 4,977,519, Cl. 364-519.000.
Ricoh Research Institute of General Electronics Co., Ltd.: *See*—
Ino, Masumitsu; Kohata, Mitsuhiro; Itagaki, Masanori; Nagata, Takehito; and Tanaka, Hiroyuki, 4,977,304, Cl. 250-208.100.
Rieter Machine Works, Ltd.: *See*—
Meyer, Urs; and Lattion, Andre, 4,976,098, Cl. 57-308.000.
Rifaat, Mahassen S. Sun visor. 4,976,486, Cl. 296-97.800.
Right Products, Inc.: *See*—
Wickersham, Wayne M.; Wickersham, Colleen A.; Diener, Kevin G.; Diener, JoAnn S.; and Skogler, Brian, 4,976,448, Cl. 280-47.200.
Rikimaru, Hiroaki; Nakatsuji, Tadao; Umaba, Toshikatsu; Nagano, Kazuhiko; Mishina, Kazuya; and Shimizu, Hiromitsu, to Sakai Chemical Industry Co., Ltd.; and Mitsubishi Jukogyo Kabushiki Kaisha. Catalyst for denitrizing nitrogen oxides contained in waste gases. 4,977,127, Cl. 502-309.000.

Riley, Kenneth L.: *See*—
Mauldin, Charles H.; and Riley, Kenneth L., 4,977,126, Cl. 502-242.000.
Ring King Visibles, Inc.: *See*—
Jessen, Ross A.; and Drake, Craig D., 4,976,391, Cl. 226-196.000.
Rinz, James E.: *See*—
Cesa, Mark C.; Rinz, James E.; Klopman, Gilles; and Kopp, Teodora T., 4,977,272, Cl. 548-336.000.
Ripke, Norbert, to Huels Aktiengeselischaft. Process for the sulfation of alkyloligoglycosides. 4,977,253, Cl. 536-118.000.
Ripley, Ian; and Needham, Anthony H., to Great Eastern (Bermuda) Ltd. Method and apparatus for introducing and positioning a tank contents removal means. 4,976,278, Cl. 137-15.000.
Rippa, Samuel: *See*—
Levy, Nessim I.; Dyn, Nira; and Rippa, Samuel, 4,976,035, Cl. 33-1.00A.
Ritchie, Ian T.; and Kittler, Wilfred C., to Andus Corporation. Tranparent conductive coatings. 4,977,013, Cl. 428-212.000.
Rivas, Olegario; Newski, Alejandro; and Antunez, Simon, to Intevep, S.A. Self lubricating, two stage variable compressor. 4,976,591, Cl. 417-254.000.
Robert Bosch GmbH: *See*—
Brunel, Andre , 4,976,236, Cl. 125-300.000.
Dobler, Klaus; Hachtel, Hanajorg; and Zimmermann, Georg, 4,976,160, Cl. 74-862.360.
Eckert, Konrad, 4,976,244, Cl. 123-501.000.
Graner, Juergen; Kirchner, Marcel; and Kubach, Hans, 4,976,405, Cl. 251-129.160.
Kienzle, Wolfgang; Sauer, Rudolf; and Woehr, Otto, 4,976,145, Cl. 73-204.220.
Kohl, Walter; and Nagel, Karl, 4,977,340, Cl. 307-520.000.
Schmied, Helmut; and Kalkhof, Bernd, 4,976,247, Cl. 123-651.000.
Stabler, Manfred, 4,976,071, Cl. 51-168.000.
Robert, Kearny Q.: *See*—
Sawhney, A. Paul S.; Folk, Craig L.; and Robert, Kearny Q., 4,976,096, Cl. 57-12.000.
Robertiello, Andrea: *See*—
Baradel, Agostino; Della Penna, Gino; Gulinelli, Silvio; Valdiserri, Mario; and Robertiello, Andrea, 4,976,864, Cl. 210-610.000.
Roberts, John L., to Logobugs Limited. Advertising or promotional item. 4,976,056, Cl. 40-299.000.
Roberts, Mason R.; and Means, G. Robb. Cold storage cabinet using liquified gas. 4,976,112, Cl. 62-48.100.
Robertshaw Controls Company: *See*—
Geary, Frederick J., 4,976,605, Cl. 431-27.000.
Robinson, Bruce R., to NSA Acquisition, Inc. Carbon dioxide injection interface in carbonation apparatus. 4,976,894, Cl. 261-64.100.
Robinson, Darrell: *See*—
Langdon, Albert K.; Learmont, Robert O.; Robinson, Darrell; Goozen, Robert; Lewis, Michael; Williams, John; Pruehs, Allen V.; and Shincovich, John T., 4,977,482, Cl. 361-366.000.
Robson, Ronald R.: *See*—
Eckhardt, Wilfred O.; Williamson, Weldon S.; Hancock, Donald J.; and Robson, Ronald R., 4,977,329, Cl. 250-551.000.
Rockefeller University, The: *See*—
Chowdhury, Swapan K.; Katta, Viswanatham; and Chait, Brian T., 4,977,320, Cl. 250-288.000.
Rockford Controls Corporation: *See*—
Bramblet, John W., 4,976,403, Cl. 251-214.000.
Rodel, Reinhard: *See*—
Bauer, Gerhard; and Rodel, Reinhard, 4,977,205, Cl. 524-496.000.
Roderfeld, Heinrich: *See*—
Dammann, Johannes; Heidjann, Franz; and Roderfeld, Heinrich, 4,976,654, Cl. 460-80.000.
Rodriguez-Cavazos, Enrique; Altmanshofer, Robert D.; Parker, Robert P.; and Hall, Estill T., Jr., to RCA Licensing Corportion. Convergence control system. 4,977,355, Cl. 315-368.000.
Rodriguez, Domingo; Quintero, Lirio; Terrer, Maria T.; Jimenez, Euler; Silva, Felix; and Salazar, Jose. Process for stabilizing a hydrocarbon in water emulsion and resulting emulsion product. 4,976,745, Cl. 44-301.000.
Rogers, Elmer V., Jr., to Pipe Line Development Company, The. High-pressure hydraulic gun. 4,976,372, Cl. 222-324.000.
Rohde, Johann H.; and Meurer, Hans, to Mannesmann Aktiengesellschaft. Double roller crossrolling mill for piercing and stretching of solid and hollow blocks. 4,976,127, Cl. 72-95.000.
Rohde & Schwarz GmbH & Co.: *See*—
Maucksch, Thomas; Holzmann, Gottfried; and Korber, Frank, 4,977,607, Cl. 455-10.000.
Rohm Co., Ltd.: *See*—
Otani, Kenzi; and Ito, Fimihiko, 4,977,356, Cl. 318-138.000.
Roos, Leo: *See*—
Correa, Jose L.; Stumpf, Robert C.; Farnum, Charles L.; and Roos, Leo, 4,976,817, Cl. 156-555.000.
Rorer Pharmaceutical Corporation: *See*—
Huang, Fu-Chih; Campbell, Henry F.; Learn, Keith S.; and Galemmo, Robert A., Jr., 4,977,162, Cl. 514-314.000.
Lee, Ted C. K.; and Hrinda, Michael E., 4,977,246, Cl. 530-383.000.
Roschenbleck, Benno: *See*—
Schmeling, Edith L.; Roschenbleck, Benno; and Weidemann, Michael H., 4,976,830, Cl. 204-58.400.
Rose, David; Lieske, Edgar; and Maak, Norbert, to Henkel Kommanditgesellschaft auf Aktien. META-aminophenols useful as oxidation hair dye couplers. 4,976,742, Cl. 8-412.000.
Rosen, Bruce E.: *See*—
Goodwin, James M.; Rosen, Bruce E.; Vidal, Jacques J.; Mackenzie, John D.; and Wu, Edward T. H., 4,977,540, Cl. 365-49.000.
Rosenberg, Melvyn; Eli, Ilana; and Weiss, Ervin. Dental caries diagnostic and localization technique. 4,976,951, Cl. 424-7.100.
Rosenberg, Saul H.; Luly, Jay R.; and Plattner, Jacob J., to Abbott Laboratories. Functionalized peptidyl aminodiols and -triols 4-amino-5-cyclohexyl-3-hydroxy-1,2-oxopentane and derivatives thereof. 4,977,277, Cl. 549-215.000.
Rosenblum, Jeffrey L. Position-adjustable thoracic catheter. 4,976,688, Cl. 604-95.000.
Rosner, Andrew: *See*—
Lipsky, Milton H.; and Rosner, Andrew, 4,976,923, Cl. 422-58.000.
Ross, David S., to Zimpro/Passavant Inc. Pulsing portions of a filter cell to extend a filter run. 4,976,873, Cl. 210-744.000.
Rouquette, Robert E.: *See*—
Arthur, James D.; Sanderford, H. Britton, Jr.; and Rouquette, Robert E., 4,977,577, Cl. 375-1.000.
Rousseau, Gerard; and Pastureau, Nicole. Process for the production of a composite material with matrix and reinforcing fibers of carbon. 4,976,899, Cl. 264-29.500.
Roussel, Pierre: *See*—
Eisenberger, Benjamin; and Roussel, Pierre, 4,977,372, Cl. 324-166.000.
Rousset, Jacky: *See*—
Martineu, Pierre; Saunier, Christiane; Rousset, Jacky; and Jacquemet, Christian, 4,977,192, Cl. 521-56.000.
Routti, Jorma. Rowing device. 4,976,423, Cl. 272-72.000.
Rowe, James. Apparatus for the generation of turbulence in internal combustion engines. 4,976,248, Cl. 123-659.000.
RTC Industries, Inc.: *See*—
Zucker, Armand S.; Breslow, David S.; and Giebel, Harald, 4,976,360, Cl. 211-186.000.
Rubatex Corporation: *See*—
Oberle, William L., 4,976,902, Cl. 264-54.000.
Ruben, F. B.: *See*—
Westfal, Horst; and Ruben, F. B., 4,977,065, Cl. 430-271.000.
Rubtsov, Nikolai M.: *See*—
Kozlov, Vladimir I.; Redkin, Vladimir F.; Kozyrev, Sergei A.; Borisov, Vasily N.; Boldyrev, Vladimir V.; Krebel, Fedor R.; and Rubtsov, Nikolai M., 4,976,472, Cl. 241-172.000.
Rudden, Frank G.; and Sarno, Walter R. Load management device and method of use. 4,977,515, Cl. 364-492.000.
Rudnick, Paul J.; Toldalagi, Paul M.; and Neff, Harlan, to Psicom Sports Incorporated. Electronic sports information retrieval device. 4,977,503, Cl. 364-410.000.
Rudolph, Peter K. C.; and Bader, Douglas L., to Boeing Company, The. Anti-icing system for aircraft. 4,976,397, Cl. 244-134.00B.
Ruempler, Klaus-Dieter: *See*—
Kerth, Juergen; Werner, Rainer A.; Zolk, Ralf; Ruempler, Klaus-Dieter; Schweier, Guenther; Mueller-Mall, Rudolf; and Grubert, Wolfgang, 4,977,210, Cl. 525-53.000.
Rule, Mark: *See*—
Fagerburg, David R.; Watkins, Joseph J.; Lawrence, Paul B.; and Rule, Mark, 4,977,236, Cl. 528-226.000.
Watkins, Joseph J.; Fagerburg, David R.; Lawrence, Paul B.; and Rule, Mark, 4,977,224, Cl. 525-471.000.
Rumpf, David S.; and Lemieux, Paul R., to Norton-Alcoa. Method for making lightweight proppant for oil and gas wells. 4,977,116, Cl. 501-128.000.
Runion, Tommie H.: *See*—
Galloway, F. Merrill; Campbell, Donald W.; and Runion, Tommie H., 4,976,047, Cl. 33-735.000.
Runyan, James F.: *See*—
Carmichael, Keith L.; and Runyan, James F., 4,976,186, Cl. 91-166.000.
Russell, Jim L. Underground valve box. 4,976,366, Cl. 220-4.00B.
Rutledge, Justin; and Rutledge, Steven. Rodent or reptile repelling product and method. 4,976,062, Cl. 43-131.000.
Rutledge, Steven: *See*—
Rutledge, Justin; and Rutledge, Steven, 4,976,062, Cl. 43-131.000.
Rydell, Mark A.: *See*—
Parins, David J.; Rydell, Mark A.; and Stasz, Peter, 4,976,711, Cl. 606-48.000.
Ryobi Limited: *See*—
Nishi, Naomi; Kami, Shigetake; and Yamaguchi, Takashi, 4,976,918, Cl. 420-546.000.
Yamanari, Hiroshi; and Fujisawa, Nobuhiko, 4,976,197, Cl. 101-137.000.
Ryu, Shiro; and Mochizuki, Kiyohumi, to Kokusai Denshin Denwa Co., Ltd. Controller for semiconductor laser light source. 4,977,564, Cl. 372-32.000.
Ryynanen, Seppo I., to Lisop Oy. Method of and apparatus for separating a medium in different components by means of gravity. 4,976,875, Cl. 210-788.000.
S.N.C. Livbag: *See*—
Perotto, Christian, 4,976,795, Cl. 149-19.400.
Saab-Scania Aktiebolag: *See*—
Sjoberg, Bengt E., 4,977,401, Cl. 340-975.000.
Saari, David W.: *See*—
Abujudom, David N., II; Dougherty, Thomas J.; Inkmann, Mark S.; Johnson, Richard T.; Karolek, Neil C.; and Saari, David W., 4,976,327, Cl. 180-68.200.

Sabatelli, Anthony D.: *See—*
Orr, Thomas V.; and Sabatelli, Anthony D., 4,976,953, Cl. 424-47.000.
Sachs, Baruch: *See—*
Diman, Charles; Marcus, David; Mitchell, Philip; and Sachs, Baruch, 4,976,876, Cl. 210-791.000.
Sachse, Bruno; Weiskopf, Hubert; Engel, Joachim; and Zintel, Jakob, to Asea Brown Boveri Aktiengesellschaft. Device for removing a blower from a gas-cooled nuclear reactor. 4,976,914, Cl. 376-391.000.
Sachtler AG Kommunikationstechnik: *See—*
Spianti, Dany, 4,976,387, Cl. 224-262.000.
Sadamitsu, Katsushi: *See—*
Murayama, Junichi; Iiyama, Kazuto; Toyama, Niichi; Sadamitsu, Katsushi; and Takashima, Hideki, 4,977,000, Cl. 427-424.000.
Sadler, Alan A.: *See—*
Davey, Rodney J.; and Sadler, Alan A., 4,976,519, Cl. 350-96.230.
Safaai-Jazi, Ahmad. Narrowband fiberoptic spectral filter formed from fibers having a refractive index with a W-profile and a step profile. 4,976,512, Cl. 350-96.330.
Safari, Ahmad: *See—*
Giniewicz, Jayne R.; Newnham, Robert E.; Cross, Leslie E.; and Safari, Ahmad, 4,977,547, Cl. 367-157.000.
Sahara, Terutaka: *See—*
Hiratsuka, Yutaka; Ohmi, Tadahiro; Murota, Junichi; Fujisaki, Yoshio; Noda, Masato; Kitada, Yoshimitsu; and Sahara, Terutaka, 4,976,815, Cl. 156-345.000.
Sahota, Harvinder. Topless catheters. 4,976,691, Cl. 604-96.000.
Sailor Pen Co., Ltd., The: *See—*
Ohshita, Katsuji, 4,976,560, Cl. 401-65.000.
Saint-Gobain Vitrage International: *See—*
Kuster, Hans-Werner; and Vanaschen, Luc, 4,976,766, Cl. 65-289.000.
St. John, Roger: *See—*
Morris, John M.; and St. John, Roger, 4,976,104, Cl. 60-412.000.
Saito, Kajin: *See—*
Ozawa, Sinya; Kondo, Katsumi; and Saito, Kajin, 4,976,777, Cl. 75-255.000.
Saito, Tadao: *See—*
Iizuka, Shigeo; and Saito, Tadao, 4,976,563, Cl. 401-176.000.
Saito, Takao: *See—*
Ohishi, Masao; Kida, Katsuaki; Ishikawa, Katsukiyo; Saito, Takao; and Nagata, Kouichi, 4,977,053, Cl. 430-106.600.
Saito, Takeshi: *See—*
Mizuno, Toshiya; Teramoto, Yoshikichi; Saito, Takeshi; and Wakabayashi, Juichi, 4,976,908, Cl. 264-210.200.
Saitou, Kenji: *See—*
Takehara, Kenji; and Saitou, Kenji, 4,976,300, Cl. 152-454.000.
Saitou, Mitsuo; and Suga, Yoichi, to Fuji Photo Film Co., Ltd. Silver halide emulsion comprising substantially circular monodisperse tabular silver halide grains and photographic material using the same. 4,977,074, Cl. 430-567.000.
Sakabe, Yukio: *See—*
Mori, Yoshiaki; Takagi, Hiroshi; and Sakabe, Yukio, 4,977,485, Cl. 361-321.000.
Sakae Riken Kogyo Co., Ltd.: *See—*
Okano, Susumu, 4,977,487, Cl. 362-32.000.
Sakagami, Koubun: *See—*
Takanashi, Itsuo; Ichitou, Toshikatsu; Kitamura, Hiroki; Yamamura, Takashi; Sakagami, Koubun; and Nakano, Atsushi, 4,977,417, Cl. 346-160.000.
Sakai Chemical Industry Co., Ltd.: *See—*
Rikimaru, Hiroaki; Nakatsuji, Tadao; Umaba, Toshikatsu; Nagano, Kazuhiko; Mishina, Kazuya; and Shimizu, Hiromitsu, 4,977,127, Cl. 502-309.000.
Sakai, Hiroshi: *See—*
Kurosawa, Kimimasa; Harada, Chikao; Sakai, Hiroshi; and Niwa, Minoru, 4,976,268, Cl. 128-687.000.
Sakai, Ko: *See—*
Niimura, Toshinobu; Takahashi, Tadashi; Kashiba, Mutsuro; Sakai, Ko; and Kano, Tokio, 4,977,078, Cl. 435-7.000.
Sakai, Mitsugu: *See—*
Karaki, Koichi; Sakai, Mitsugu; and Sasaki, Yasuo, 4,977,544, Cl. 367-7.000.
Sakai, Takashi: *See—*
Kuzuya, Susumu; Shimizu, Seiji; Kato, Mikio; Ishikawa, Yujiro; Sakai, Takashi; and Yuki, Eiji, 4,976,558, Cl. 400-615.200.
Sakaki, Hirokazu: *See—*
Ohba, Hisao; Oda, Kazutaka; Sakaki, Hirokazu; Shirai, Akira; and Ohashi, Azusa, 4,976,198, Cl. 101-459.000.
Sakaki, Masaharu; and Yamazaki, Hiroko, to Sumitomo Chemical Company, Limited. Plant male sterilant. 4,976,775, Cl. 71-106.000.
Sakakibara, Kenji: *See—*
Asai, Shin; Akao, Michitoshi; Katoh, Tokunori; Sakakibara, Kenji; Izaki, Takesi; and Morisaki, Hiroshi, 4,977,437, Cl. 355-27.000.
Sakakibara, Shiro; and Fukaya, Takaharu, to Aisin Aw Co., Ltd. Actuator for friction engagement device. 4,976,347, Cl. 192-20.000.
Sakakura, Shigeki; and Hayashida, Nobuyuki, to Fujitsu Limited. System for drive control of toner agitator in image-forming apparatus. 4,977,428, Cl. 355-245.000.
Sakamoto, Masanori: *See—*
Takatoh, Kohki; Sakamoto, Masanori; and Sunohara, Kazuyuki, 4,976,887, Cl. 252-299.620.
Sakamoto, Toshiyuki: *See—*
Shiomi, Makoto; Ohsawa, Michitaka; Sakamoto, Toshiyuki; Matsumi, Kuninori; Ozeki, Kosuke; Yuki, Ikuo; and Sato, Kenji, 4,977,446, Cl. 358-60.000.
Sakamura, Ken; Shimizu, Toru; Iwata, Shunichi; and Enomoto, Tatsuya, to Mitsubishi Denki Kabushiki Kaisha. Data processor. 4,977,497, Cl. 364-200.000.
Sakashita, Mitsuaki: *See—*
Fujikawa, Yoshihiro; Suzuki, Mikio; Iwasaki, Hiroshi; Sakashita, Mitsuaki; and Kitahara, Masaki, 4,977,161, Cl. 514-302.000.
Sakata, Eiji: *See—*
Chiyajo, Masanobu; Kuroki, Toshio; and Sakata, Eiji, 4,977,042, Cl. 429-49.000.
Sakaue, Akinori: *See—*
Kanamaru, Shinichi; Yoshimura, Shushichi; Hisashi, Hideyuki; and Sakaue, Akinori, 4,976,945, Cl. 423-450.000.
Sakubata, Takashi: *See—*
Hisanaga, Akinori; Sakubata, Takashi; and Yoshioka, Tetsuo, 4,976,547, Cl. 366-169.000.
Sakuraba, Shuhei: *See—*
Ohtani, Hideya; Momoi, Toshimitsu; Ooi, Eiji; Sakuraba, Shuhei; Morita, Masayuki; and Wakashima, Yoshiaki, 4,977,441, Cl. 357-70.000.
Sakuraba, Yasuya: *See—*
Motegi, Takeo; Sakuraba, Yasuya; Iguchi, Hiroyuki; and Kasahara, Kaoru, 4,976,768, Cl. 71-76.000.
Sakurada, Satoshi; Tagaya, Nobuaki; Miura, Tadashi; Maeshima, Tsugio; and Hashimoto, Takao, to Toa Nenryo Kogyo K.K. Binderless zeolite catalysts, production thereof and catalytic reaction therewith. 4,977,120, Cl. 502-64.000.
Sakurai, Kazuya: *See—*
Horiuchi, Makoto; Shimizu, Atsushi; Miyakawa, Yoshitaka; and Sakurai, Kazuya, 4,976,105, Cl. 60-413.000.
Salazar, Jose: *See—*
Rodriguez, Domingo; Quintero, Lirio; Terrer, Maria T.; Jimenez, Euler; Silva, Felix; and Salazar, Jose, 4,976,745, Cl. 44-301.000.
Salemka, Mark E.; and Lorenzen, James W., to Wacker Silicones Corporation. Method and apparatus for filling tubes. 4,976,091, Cl. 53-467.000.
Salensky, George A.; and Thoman, Thomas S., to Amoco Corporation. Process for using a composition for a solder mask. 4,976,813, Cl. 156-230.000.
Salsman, Robert K., to Seydel Companies, Inc., The. Water-soluble or water-dispersible polyester sizing compositions. 4,977,191, Cl. 521-48.000.
Salyers, Abigail A.; and Kuritza, Alex P., to University of Illinois Board of Trustees. DNA probes for identification of bacteroides species. 4,977,251, Cl. 536-27.000.
Samsonite Corporation: *See—*
Nordstrom, Mark B., 4,976,352, Cl. 206-316.200.
Samsung Electron Devices Co., Ltd.: *See—*
Jung, Jong-in, 4,976,644, Cl. 445-50.000.
Lee, Seung J., 4,976,643, Cl. 313-276.000.
Sanbayashi, Daisuke: *See—*
Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, 4,976,241, Cl. 123-425.000.
Sanchez, Joseph P.; and Trehan, Ashok K., to Warner-Lambert Company. 5-amino and 5-hydroxy-6-fluoroquinolones as antibacterial agents. 4,977,154, Cl. 514-254.000.
Sanchez, Victor; Biscans, Beatrice; Couderc, Jean-Pierre; and Riba, Jean-Pierre, to Centre National de la Recherche Scientifique. Method for the separation of biological macromolecules by chromatography. 4,976,865, Cl. 210-635.000.
Sand, Bruce J. Method for collagen treatment. 4,976,709, Cl. 606-5.000.
Sanderford, H. Britton, Jr.: *See—*
Arthur, James D.; Sanderford, H. Britton, Jr.; and Rouquette, Robert E., 4,977,577, Cl. 375-1.000.
Sanders, Calvin E. Wire key holder. 4,976,124, Cl. 70-458.000.
Sanders, Robert N.: *See—*
Laurent, Sebastian M.; and Sanders, Robert N., 4,976,971, Cl. 426-2.000.
Sanderson, George; and Strowe, Robert J., to Becton, Dickinson and Company. Syringe pump and the like for delivering medication. 4,976,696, Cl. 604-154.000.
Sanderson, John R.: *See—*
Marquis, Edward T.; Keating, Kenneth P.; Meyer, Robert A.; and Sanderson, John R., 4,977,285, Cl. 549-529.000.
Sandoz Ltd.: *See—*
Amstutz, Rene ; Bolliger, Georg; and Shapiro, Gideon, 4,977,176, Cl. 514-397.000.
Negami, Shin'ichi; Nomachi, Hiroshi; Nemoto, Toru; Tanaka, Yoshio; and Ohta, Akira, 4,977,227, Cl. 527-400.000.
Sandvik AB: *See—*
Hedlund, Jan-Gunnar; and Asberg, Bengt A., 4,976,496, Cl. 299-81.000.
Sankey, George H.: *See—*
Homer, Nigel J.; Jackson, Graham; Sankey, George H.; and Simpson, Philip J., 4,977,254, Cl. 536-124.000.
Sankyo Aluminum Industry Company Limited: *See—*
Oki, Yoshinari; Tanaka, Takeshi; Tuno, Ryoji; and Yoshida, Yoshihiro, 4,976,130, Cl. 72-269.000.
Sannikov, Rashit K.: *See—*
Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A., 4,976,322, Cl. 175-57.000.

Sano, Takashi: *See*—
Tashiro, Koichi; Ikezawa, Mamoru; Sano, Takashi; Matsuura, Kosei; and Nakatani, Hajime, 4,976,438, Cl. 273-313.000.
Sano, Yoshikazu, to Matsushita Electric Industrial Co., Ltd. Camera with development function. 4,977,420, Cl. 354-79.000.
Sano, Yukinori; Kashiwaya, Mineo; and Ikeda, Yuuji, to Hitachi, Ltd.; and Hitachi Automotive Engineering Co., Ltd. Internal combustion engine control system. 4,976,243, Cl. 123-492.000.
Sanofi: *See*—
Bernat, Andre ; Delabassee, Denis; Frehel, Daniel; Maffrand, Jean-Pierre; and Vallee, Eric, 4,977,168, Cl. 514-330.000.
Descamps, Marcel; and Verstraeten, Walter, 4,977,274, Cl. 548-455.000.
Jansen, Franz; and Gros, Pierre, 4,977,280, Cl. 549-343.000.
Sanri Kabushiki Kaisha: *See*—
Tsutsumi, Shigeru, 4,976,900, Cl. 264-39.000.
Sanshin Kogyo Kabushiki Kaisha: *See*—
Torigai, Katsumi; and Takahashi, Masanori, 4,976,636, Cl. 440-1.000.
Sanville, Katherine M.: *See*—
Decker, James D.; Burch, Wendell D.; Brady, Daniel F.; Hinzman, Gary W.; Kromrey, Edward P.; Sanville, Katherine M.; Southworth, Donald R.; Chace, Mark S.; and Peloquin, Perry M., 4,976,137, Cl. 73-53.000.
Sanyo Electric Co., Ltd.: *See*—
Suzuki, Hirohisa; Kabashima, Akira; Yamagishi, Mikio; and Ogawa, Ryuichi, 4,977,615, Cl. 455-277.000.
Saotome, Shigeru: *See*—
Agano, Toshitaka; and Saotome, Shigeru, 4,977,322, Cl. 250-327.200.
Saporiti Italia S.p.A.: *See*—
Saporiti, Roberto; Lipparini, Mauro; and Tapinassi, Roberto, 4,976,021, Cl. 29-91.100.
Saporiti, Roberto; Lipparini, Mauro; and Tapinassi, Roberto, to Saporiti Italia S.p.A. Foundation process for assembling furniture. 4,976,021, Cl. 29-91.100.
Sargeant, Bruce A.; Hoffenberg, Mark J.; Reasons, Rob; and Walpert, Robert A., to Schwinn Bicycle Company. Load control for exercise device. 4,976,424, Cl. 272-73.000.
Sarges, Reinhard: *See*—
Howard, Harry R., Jr.; and Sarges, Reinhard, 4,977,178, Cl. 514-418.000.
Sarno, Walter R.: *See*—
Rudden, Frank G.; and Sarno, Walter R., 4,977,515, Cl. 364-492.000.
Sartori, Guido; and Ho, W. S. Winston, to Exxon Research and Engineering Company. Polyester membranes for aromatics/saturates separation. 4,976,868, Cl. 210-640.000.
Sasajima, Koji; and Ishikawa, Yoshikazu, to Honda Giken Kogyo Kabushiki Kaisha. Method of controlling speed reduction ratio for a continuously variable transmissions. 4,976,169, Cl. 74-866.000.
Sasakawa, Tomoyoshi: *See*—
Sukawa, Hiroshi; Hirose, Sumio; Takahara, Shigeru; and Sasakawa, Tomoyoshi, 4,977,064, Cl. 430-270.000.
Sasaki, Isao; Mukai, Nobuhiro; and Ige, Hitoshi, to Mitsubishi Rayon Company Limited. Photopolymerizable dental composition. 4,977,197, Cl. 522-14.000.
Sasaki, Kazuaki: *See*—
Yamamoto, Saburo; Hosoda, Masahiro; Sasaki, Kazuaki; and Kondo, Masaki, 4,977,568, Cl. 372-46.000.
Sasaki, Yasuo: *See*—
Karaki, Koichi; Sakai, Mitsugu; and Sasaki, Yasuo, 4,977,544, Cl. 367-7.000.
Sasaki, Yutaka: *See*—
Tsunoda, Takeo; Takeo, Setsu; Nobusawa, Tatsuya; Enomoto, Norihide; Takahashi, Hiroyasu; Watanabe, Minoru; Sasaki, Yutaka; and Tanaka, Kunihiro, 4,976,941, Cl. 423-247.000.
Sathe, Sanjeev B.: *See*—
Tong, Timothy W.; Sathe, Sanjeev B.; and Peck, Robert E., 4,977,111, Cl. 501-95.000.
Sato, Hideo: *See*—
Ohno, Shigeru; Kitatani, Katsuji; Makino, Naonori; Hoshi, Satoshi; and Sato, Hideo, 4,977,051, Cl. 430-58.000.
Sato, Hiroshi: *See*—
Kadouchi, Eiji; Matsumoto, Isao; Fujii, Takabumi; Sato, Hiroshi; and Hino, Takashi, 4,977,043, Cl. 429-54.000.
Sato, Kenji: *See*—
Shiomi, Makoto; Ohsawa, Michitaka; Sakamoto, Toshiyuki; Matsumi, Kuninori; Ozeki, Kosuke; Yuki, Ikuo; and Sato, Kenji, 4,977,446, Cl. 358-60.000.
Sato, Masamichi: *See*—
Nagashima, Yasuo; Soeda, Haruo; Sato, Masamichi; and Kubo, Takashi, 4,976,020, Cl. 29-90.010.
Sato, Susumu: *See*—
Hasegawa, Hiroshi; Mogi, Kinichi; Shioiri, Noriaki; Sato, Susumu; and Katori, Tatsuhiko, 4,977,275, Cl. 548-539.000.
Sato, Tsunehiko: *See*—
Chino, Naoyoshi; Hiraki, Yasuhito; and Sato, Tsunehiko, 4,976,992, Cl. 427-131.000.
Sato, Yuji: *See*—
Honjo, Toshio; Sato, Yuji; Fukushima, Yoshihiro; Nawa, Masayoshi; and Yasuda, Shinichiro, 4,977,054, Cl. 430-108.000.
Satoh, Motohiro: *See*—
Nakajima, Tadakatsu; Kuwahara, Heikichi; Ohashi, Shigeo; Satoh, Motohiro; Yamada, Toshihiro; Kasai, Kenichi; Kobayashi, Satomi; and Watanabe, Akihide, 4,977,444, Cl. 357-82.000.
Satoji, Fuminori, to NTN -Rulon Industries, Co. Ltd. Lubricating rubber composition. 4,976,880, Cl. 252-12.000.
Satou, Hiroyuki: *See*—
Itagaki, Takaharu; Okada, Hiroyoshi; Miyake, Masao; Kobayashi, Takaaki; Tosa, Takahumi; and Satou, Hiroyuki, 4,976,976, Cl. 426-69.000.
Saturn Corporation: *See*—
McKee, Peter G., 4,976,023, Cl. 29-523.000.
Sauer, Rudolf: *See*—
Kienzle, Wolfgang; Sauer, Rudolf; and Woehr, Otto, 4,976,145, Cl. 73-204.220.
Saul, Donna E.: *See*—
Pierce, Wesley L., 4,976,223, Cl. 119-61.000.
Saunier, Christiane: *See*—
Martineu, Pierre; Saunier, Christiane; Rousset, Jacky; and Jacquemet, Christian, 4,977,192, Cl. 521-56.000.
Sautter, Kenneth M.: *See*—
Batchelder, Tom W.; Sautter, Kenneth M.; and Memovich, Gary H., 4,977,330, Cl. 250-560.000.
Savage, Chester: *See*—
Scholle, William R.; Savage, Chester; and Hardwick, William A., Jr., 4,976,381, Cl. 222-484.000.
Sawada, Hiroshi: *See*—
Sonoda, Yukihiro; Osawa, Kouichi; Kanai, Hiroshi; Hoshi, Kouichi; Matsuoka, Hiroki; Ohashi, Michihiro; and Sawada, Hiroshi, 4,976,242, Cl. 123-489.000.
Sawada, Kazuo, to Sumitomo Electric Industries, Ltd. Electric conductor and method of manufacturing same. 4,976,792, Cl. 148-404.000.
Sawada, Kazuyuki; Ogawa, Hisashi; Yano, Kohsaku; and Fujita, Tsutomu, to Matsushita Electric Industrial Co., Ltd. Method for producing a semiconductor device by filling hollows with thermally decomposed doped and undoped polysilicon. 4,977,104, Cl. 437-162.000.
Sawai, Kenji; Takeuchi, Tuneto; and Ito, Jinichi, to Omron Tateisi Electronics Co.; and Kabushiki Kaisha Sankyo Seiki Seisakusho. Servo motor system requiring a reduced number of signal transmission lines. 4,977,359, Cl. 318-561.000.
Sawhney, A. Paul S.; Folk, Craig L.; and Robert, Kearny Q., to United States of America, Agriculture. System for producing core/wrap yarn. 4,976,096, Cl. 57-12.000.
Saylor, Charles H. M.; and Jabbour, Kamal, to Niagara Mohawk Power Corporation. Real time method for processing alaarms generated within a predetermined system. 4,977,390, Cl. 340-521.000.
Scannapieco, Steven N., to Goodyear Tire & Rubber Company, The. Solid state polymerization of porous pills made by compacting polyester prepolymers. 4,977,196, Cl. 521-182.000.
Schad, Karl. Specimen excision forceps. 4,976,723, Cl. 606-170.000.
Schaefer, Eckhard, to Hoechst Aktiengesellschaft. Magnetooptical recording medium bonded with a flexible foam adhesive. 4,977,019, Cl. 428-317.500.
Schanbacher, Larry M.: *See*—
Hirsh, Kenneth R.; Schanbacher, Larry M.; and Cha, Alice S., 4,976,983, Cl. 426-594.000.
Scharting, Gunter; and Ortmann, Wolfgang, to FAG Kugelfischer Georg Schafer (KGaA). Transportation and mounting sleeve for row of rolling element. 4,976,551, Cl. 384-448.000.
Schaus, John M., to Eli Lilly and Company. Pyridoquinoline dopamine agonists, compositions and use. 4,977,149, Cl. 514-210.000.
Schaus, John M.: *See*—
Huser, Diane L.; and Schaus, John M., 4,977,160, Cl. 514-293.000.
Scheck, Werner; Idler, Siegfried; and Furrer, Bernard, to Baumer Electric AG. Method and apparatus for optical distance measurement. 4,976,543, Cl. 356-375.000.
Scheer, Gerhard: *See*—
Muendlein, Werner; Scheer, Gerhard; and Stolz, Gerhard, 4,976,574, Cl. 409-232.000.
Scheggi, Annamaria V.: *See*—
Falcial, Riccardo; Scheggi, Annamaria V.; Baldini, Francesco; and Bechi, Paolo, 4,976,265, Cl. 128-634.000.
Scheideler, Wilfried: *See*—
Weisshaupt, Herbert P.; Orth, Hans; Lips, Hendrik R ; and Scheideler, Wilfried, 4,976,203, Cl. 102-476.000.
Scheinert, Yaakov: *See*—
Herzlinger, Andrei; Shorr, Leonard M.; Antebi, Salomone; Morel-Fisher, Theodor; Utevskii, Lev; and Scheinert, Yaakov, 4,977,262, Cl. 544-221.000.
Schenck, Robert C.: *See*—
Helferich, Richard L.; and Schenck, Robert C., 4,976,760, Cl. 55-487.000.
Scherer, Paul T.: *See*—
Miller, Benson L.; Scherer, Paul T.; and Maclin, Neiman C., 4,976,205, Cl. 108-47.000.
Schering Agrochemicals Limited: *See*—
Ball, Keith V.; Halblander, Karl-Heinz; and Loftus, Barry N., 4,976,686, Cl. 604-61.000.
Schering Aktiengesellschaft: *See*—
Jungblut, Peter; Wiechert, Rudolf; and Bittler, Dieter, 4,977,147, Cl. 514-171.000.
Schering Corporation: *See*—
Hahn, Paul; Reynolds, John; Tomlinson, Alan; O'Meara, Robert J.; and Drazba, Martin, 4,976,533, Cl. 351-160.00R.
Scherpenberg, Francis A.: *See*—
Dias, Donald R.; and Scherpenberg, Francis A., 4,977,537, Cl. 364-900.000.

Schiebelhuth, Heinz: *See—*
Kelterborn, Heinz; and Schiebelhuth, Heinz, 4,976,194, Cl. 99-328.000.

Schiek, Burkhard; and Uwe, Gartner F., to Laboratorium Prof. Dr. Rudolf Berthold. Method for disturbance reduction in measurement systems for analysis of emission or transmission processes. 4,977,376, Cl. 324-613.000.

Schierling, Roland; Wissmann, Michael; Nickel, Hans; and Geyer, Werner, to Andreas Stihl. Fuel-injection pump arrangement for a two-stroke engine of a handheld portable tool. 4,976,246, Cl. 123-509.000.

Schiffers, Ulrich, to Siemens Aktiengesellschaft. Combined gas and steam turbine power generating station. 4,976,101, Cl. 60-39.120.

Schilling, Peter, to Westvaco Corporation. Cationic slurry seal emulsifiers. 4,976,784, Cl. 106-277.000.

Schippert, Egbert, to Keramchemie GmbH. Method for purification of exhaust air. 4,976,751, Cl. 55-84.000.

Schleper, Bernard: *See—*
Jeromin, Lutz; Peukert, Eberhard; Gutsche, Bernhard; Wollmann, Gerhard; and Schleper, Bernard, 4,976,892, Cl. 260-410.700.

Schley, Richard A. Sine bar for compound angles. 4,976,045, Cl. 33-537.000.

Schlingmann, Merten: *See—*
Leupold, Ernst I.; Wiesner, Matthias; Schlingmann, Merten; and Rapp, Knut, 4,977,283, Cl. 549-484.000.

Schlossmann, Klas; Zembrod, Alfred; Kazda, Stanislav; Serno, Peter; and Klinksiek, Bernd, to Bayer Aktiengesellschaft. Medicament formulation containing dihydropyridines and a process for its preparation. 4,976,964, Cl. 424-450.000.

Schmeidl, Karl, to BASF Aktiengesellschaft. Preparation of rhodamine dyes in granule form by direct cooling. 4,977,278, Cl. 549-227.000.

Schmeling, Edith L.; Roschenbleck, Benno; and Weidmann, Michael H., to Electro Chemical Engineering GmbH. Method of preparing the surfaces of magnesium and magnesium alloys. 4,976,830, Cl. 204-58.400.

Schmid, Gerard: *See—*
Hofheinz, Werner; Schmid, Gerard; and Stohler, Harro, 4,977,184, Cl. 514-452.000.

Schmidt, Erhard: *See—*
Reichenberger, Helmut; Naser, Georg; and Schmidt, Erhard, 4,976,255, Cl. 128-24.00A.

Schmied, Helmut; and Kalkhof, Bernd, to Robert Bosch GmbH. Ignition device for combustion engines. 4,976,247, Cl. 123-651.000.

Schmieley, Donald A.: *See—*
Strege, Timothy A.; and Schmieley, Donald A., 4,977,524, Cl. 364-562.000.

Schnabel, Klaus: *See—*
Mensing, Hermann; Sternitzke, Reinhard; Waldeck, Karl; and Schnabel, Klaus, 4,976,676, Cl. 493-365.000.

Schneider, Georg; and Braun, Hans, to Endress u. Hauser GmbH u. Co. Arrangement for contactless measurement of the volume flow or mass flow of a moving medium. 4,976,154, Cl. 73-861.060.

Schneider, Manfred, to Max Schlatterer GmbH & Co. KG. Tape for technical use. 4,977,017, Cl. 428-229.000.

Schnittjer, Bradley J., to American Trencher, Inc. Compost windrow turner. 4,976,095, Cl. 56-350.000.

Schoessow, Glen J. Nuclear energy system using pelletized fuel in a boiling liquid reactor. 4,976,913, Cl. 376-381.000.

Scholle Corporation: *See—*
Scholle, William R.; Savage, Chester; and Hardwick, William A., Jr., 4,976,381, Cl. 222-484.000.

Scholle, William R.; Savage, Chester; and Hardwick, William A., Jr., to Scholle Corporation. Method and apparatus for dispensing liquid. 4,976,381, Cl. 222-484.000.

Scholz, James P.: *See—*
Green, Eric T.; and Scholz, James P., 4,976,634, Cl. 439-589.000.

Schreibman, Gary. Apparatus and method for preventing infection. 4,976,694, Cl. 604-140.000.

Schricker, Brian R.; and Mehrotra, Vikram P., to Pitman-Moore, Inc. Ruminant feed antacid containing potassium, sodium and chlorine. 4,976,963, Cl. 424-438.000.

Schriewer, Michael; Croche, Klaus; Zeiler, Hans-Jonchim; and Hetzner, Karl G., to Bayer Aktiengesellschaft. Process for preparing 1,8-bridged 4-quinolone-3-carboxylic acid antibacterials. 4,977,263, Cl. 544-329.000.

Schroeder, Alfred A. Dispenser switch. 4,977,300, Cl. 200-293.000.

Schroeder, Mark A.: *See—*
Diaddario, Leonard L., Jr.; and Schroeder, Mark A., 4,976,835, Cl. 204-92.000.

Schubert, Ernst: *See—*
Krakkay, Tibor; Poggi, Tatjana; and Schubert, Ernst, 4,977,225, Cl. 526-93.000.

Schubert, Gunther, to Thomas J. Lipton, Inc. Method of manufacturing a roundish food product. 4,976,978, Cl. 426-295.000.

Schuder, Bernd; and Reichardt, Manfred, to Amphenol Corporation. Chipcard reader. 4,976,630, Cl. 439-260.000.

Schuetz, Jeffrey M.: *See—*
Lustig, Stanley; Mack, Nancy M.; Schuetz, Jeffrey M.; and Vicik, Stephen J., 4,976,898, Cl. 264-22.000.

Schultz, Gert, to Stormax International A/S. Apparatus for inserting sticks into ice cream bodies. 4,976,597, Cl. 425-126.200.

Schumacher, Larry. Reactionless actuator-gimbal system. 4,976,163, Cl. 74-5.470.

Schumacher, Lawrence R.: *See—*
Holcomb, Don R., Sr.; Brown, Mark J.; and Schumacher, Lawrence R., 4,977,613, Cl. 455-182.000.

Schumann, Klaus: *See—*
Wisotzki, Klaus-Dieter; Schumann, Klaus; Engelskirchen, Konard; and Hase, Brigitte, 4,976,885, Cl. 252-174.170.

Schuster, Gary B.: *See—*
Gottschalk, Peter; Neckers, Douglas C.; Schuster, Gary B.; Adair, Paul C.; and Pappas, S. Peter, 4,977,511, Cl. 364-473.000.

Schuster, Werner: *See—*
Benninghoff, Norbert; Jaensch, Manfred; Melzer, Jaroslav; Niesar, Gunter; and Schuster, Werner, 4,976,138, Cl. 73-73.000.

Schutz, Erwin: *See—*
Klima, Hubertus; Schutz, Erwin; and Vollbrecht, Heinz-Rudiger, 4,976,979, Cl. 426-427.000.

Schwabe, Karl D., to Hoechst Aktiengesellschaft. Stoppers for injection and infusion bottles coated with plastics having polar molecular groups. 4,977,027, Cl. 428-423.900.

Schwartz, Edward M.; and Everman, Wilburn D., to Edtech Company. Adjustable wrist support. 4,976,407, Cl. 248-118.300.

Schwartz, Idan. Flat handcraft construction element with slot and opposed tabs. 4,976,652, Cl. 446-488.000.

Schwarz, Rudolf: *See—*
Pauli, Ingo; Kleinschmit, Peter; and Schwarz, Rudolf, 4,976,943, Cl. 423-336.000.

Schwarze, Frank: *See—*
Irrgeher, Fritz; and Schwarze, Frank, 4,977,018, Cl. 428-314.400.

Schweier, Guenther: *See—*
Kerth, Juergen; Werner, Rainer A.; Zolk, Ralf; Ruempler, Klaus-Dieter; Schweier, Guenther; Mueller-Mall, Rudolf; and Gruber, Wolfgang, 4,977,210, Cl. 525-53.000.

Schweiker, Eugen: *See—*
Franetzki, Manfred; Funke, Helmut; and Schweiker, Eugen, 4,976,703, Cl. 604-247.000.

Schwinn Bicycle Company: *See—*
Sargeant, Bruce A.; Hoffenberg, Mark J.; Reasons, Rob; and Walpert, Robert A., 4,976,424, Cl. 272-73.000.

SciMed Life Systems, Inc.: *See—*
Solar, Ronald J.; and Kagan, Jonathan, 4,976,690, Cl. 604-96.000.

SCM Metal Products, Inc.: *See—*
Berry, David F.; Klar, Erhard; and Svilar, Mark, 4,976,778, Cl. 75-254.000.

Scot, Jean: *See—*
Bazin, Roland M.; Obadia, Gerard; Marcotte, Louis; and Scot, Jean, 4,976,272, Cl. 128-774.000.

Scott & Fyfe Limited: *See—*
Tough, William H., 4,976,118, Cl. 66-85.00A.

Scott, Marion W.: *See—*
Welch, Albert B.; and Scott, Marion W., 4,977,562, Cl. 372-32.000.

Scripps Clinic and Research Foundation: *See—*
Shinnick, Thomas; and Houghten, Richard, 4,976,958, Cl. 424-92.000.

Scuitto, Theodore J.; Scuitto, Thomas J.; and Bernhard, Al E., to Analyte Corporation. Automatic atomic-absorption spectrometry method. 4,976,541, Cl. 356-300.000.

Scuitto, Thomas J.: *See—*
Scuitto, Theodore J.; Scuitto, Thomas J.; and Bernhard, Al E., 4,976,541, Cl. 356-300.000.

Scully-Jones, Corp.: *See—*
Wax, Cyrus T., 4,976,013, Cl. 24-129.00R.

Seagate Technology, Inc.: *See—*
Volz, Le Roy A.; and Pease, Mark E., 4,977,472, Cl. 360-78.140.

Sebhatu, Endalkachew: *See—*
Anderson, Kevin B.; and Sebhatu, Endalkachew, 4,975,998, Cl. 15-210.00B.

Secretary of State for Defence in Her Britannic Majesty's Government of the United Kingdom of Great Britain and Northern Ireland, The: *See—*
Gardiner, Robert W., 4,976,995, Cl. 427-251.000.

Segoshi, Kazuo; Okuda, Toshiyuki; Okamura, Kenji; and Yoshida, Mizuo, to Sigma Co., Ltd. Soldering material for spectacle frame and spectacle frame in which said soldering material is used. 4,976,529, Cl. 351-41.000.

Seidl, Hans; Walder, Wolfgang; and Reinhold, Walter, to Physiomed-Medizintechnik GmbH. Equipment for the treatment of lymph blockages and the like. 4,976,263, Cl. 128-421.000.

Seiko Epson Corporation: *See—*
Furuya, Yoshikiyo, 4,977,456, Cl. 358-213.130.

Seiko Instruments Inc.: *See—*
Onuki, Hideki; and Denda, Masaki, 4,977,410, Cl. 346-76.0PH.

Seiler, Max-Peter: *See—*
Louis, William J.; Berthold, Richard; Seiler, Max-Peter; and Stoll, Andre, 4,977,153, Cl. 514-237.500.

Seitz Enzinger Noll Maschinenbau Aktiengesellschaft: *See—*
Clusserath, Ludwig, 4,976,295, Cl. 141-39.000.

Seki, Kamehru; and Kubo, Isamu, to Nippon CMK, Corp. Apparatus for chamfering planar plate. 4,976,573, Cl. 409-138.000.

Sekine, Akihiro: *See—*
Hirakawa, Nobuhiko; Kashiwaba, Noriaki; Matsumoto, Hajime; Hosoda, Akihiko; Sekine, Yasuo; Isowa, Yoshikazu; Yamura, Tetsuaki; Sekine, Akihiro; and Nishikawa, Masashi, 4,977,267, Cl. 546-272.000.

Sekine, Yasuo: *See—*
Hirakawa, Nobuhiko; Kashiwaba, Noriaki; Matsumoto, Hajime; Hosoda, Akihiko; Sekine, Yasuo; Isowa, Yoshikazu; Yamura, Tetsuaki; Sekine, Akihiro; and Nishikawa, Masashi, 4,977,267, Cl. 546-272.000.

Selas S.A.: *See—*
Agius, Michel, 4,976,763, Cl. 65-287.000.

Selin, Lauri; Aaltonen, Pertti; and Illi, Heikki. Sensor construction. 4,976,844, Cl. 204-408.000.
Semlitsch, Manfred: *See*—
Frey, Otto; Semlitsch, Manfred; and Weber, Heinz, 4,976,738, Cl. 623-16.000.
Senechal, Mary J.: *See*—
Bach, Wolf; Ferrier, Donald R.; Kukanskis, Peter E.; Williams, Ann S.; and Senechal, Mary J., 4,976,990, Cl. 427-98.000.
Senghaas, Karl A.; and Senghaas, Peter. Liquid level measuring apparatus. 4,976,146, Cl. 73-313.000.
Senghaas, Peter: *See*—
Senghaas, Karl A.; and Senghaas, Peter, 4,976,146, Cl. 73-313.000.
Senkingwerke GmbH & Co.: *See*—
Hartmann, Egon, 4,976,119, Cl. 68-242.000.
Seno, Kaoru: *See*—
Narisada, Masayuki; Ohtani, Mitsuaki; Watanabe, Fumihiko; Hagishita, Sanji; Seno, Kaoru; and Kamata, Susumu, 4,976,891, Cl. 260-401.000.
Seo, Dong J. Pallet and container integrated with pallet. 4,976,365, Cl. 220-1.500.
Separation Dynamics, Inc.: *See*—
Taylor, John A., 4,976,869, Cl. 210-644.000.
Serad, Inc.: *See*—
Andrews, E. Trent; and Moore, Robert R., 4,976,702, Cl. 604-198.000.
Serizawa, Haruo: *See*—
Takikawa, Kazunori; and Serizawa, Haruo, 4,976,103, Cl. 60-299.000.
Serizawa, Seijiro, to Laurel Kaihatsu Co., Ltd. Golf putter including ball retrievel means. 4,976,436, Cl. 273-162.00E.
Serno, Peter: *See*—
Schlossmann, Klas; Zembrod, Alfred; Kazda, Stanislav; Serno, Peter; and Klinksiek, Bernd, 4,976,964, Cl. 424-450.000.
Setzer, Helmut; Sprenger, Axel; and Zeppenfeld, Josef, to SMS Schloemann-Siemag Aktiengesellschaft. Apparatus for the axial shifting of a shaft, especially of a rolling-mill roll. 4,976,129, Cl. 72-247.000.
Severence, Wayne S., Jr., to L-Tec Company. System for low voltage plasma arc cutting. 4,977,305, Cl. 219-121.390.
Sevrin, Mireille; George, Pascal; Menin, Jacques; Morei, Claude; and Bigg, Dennis, to Synthelabo. 2-[(4-piperidyl)methyl]-1,2,3,4-tetrahydro-9H-pyrido[3,4-b]indole derivatives, and their application in treating depressive state, anxiety state or hypertension. 4,977,159, Cl. 514-292.000.
Seyama, Fumio: *See*—
Tsuchida, Tetsuo; Meguro, Tatsuya; Seyama, Fumio; and Kondo, Mitsuru, 4,977,132, Cl. 503-220.000.
Seydel Companies, Inc., The: *See*—
Salsman, Robert K., 4,977,191, Cl. 521-48.000.
Shaffer, Howard Richard, to AMP Incorporated. Dies for crimping an electrical connection. 4,976,132, Cl. 72-416.000.
Shah, Jitendra T.: *See*—
Banks, Rodney H.; and Shah, Jitendra T., 4,976,871, Cl. 210-709.000.
Shajenko, Peter: *See*—
Flatley, James P.; and Shajenko, Peter, 4,977,546, Cl. 367-140.000.
Shaltes, Walter B.: *See*—
Binstock, Morton H.; and Shaltes, Walter B., 4,976,108, Cl. 60-660.000.
Shanahan, John P.: *See*—
Machold, Timothy R.; Mar, Craig E.; Mueller, Richard L., Jr.; and Shanahan, John P., 4,976,720, Cl. 606-194.000.
Shank, Jeffrey B.: *See*—
Gee, Arnold E.; and Shank, Jeffrey B., 4,976,390, Cl. 225-96.000.
Shapiro, Gideon: *See*—
Amstutz, Rene ; Bolliger, Georg; and Shapiro, Gideon, 4,977,176, Cl. 514-397.000.
Sharma, Rakesh; and Sosin, Boleslaw M., to Marconi Company Limited, The. Mixer. 4,977,617, Cl. 455-319.000.
Sharp, Harold L.; and Kinkade, Charles E., to General Motors Corporation. Transmission shifter to operator controlled mechanism interlock. 4,976,171, Cl. 74-878.000.
Sharp Kabushiki Kaisha: *See*—
Kosaka, Genji; and Matoba, Keiko, 4,977,306, Cl. 392-380.000.
Mohri, Motoo, 4,977,045, Cl. 429-192.000.
Morishita, Masakazu, 4,976,151, Cl. 73-730.000.
Obuchi, Yasuji; Hamada, Akira; Akiyama, Hirokatsu; and Nakamura, Yasuhisa, 4,976,182, Cl. 84-462.000.
Tanaka, Koichi; Yamashita, Takuo; Yamaue, Satoshi; and Nakaya, Hiroaki, 4,977,350, Cl. 313-505.000.
Yamamoto, Saburo; Hosoda, Masahiro; Sasaki, Kazuaki; and Kondo, Masaki, 4,977,568, Cl. 372-46.000.
Sharrow, Joseph F.: *See*—
Brown, Steve K.; Dixon, Larry D.; and Sharrow, Joseph F., 4,976,577, Cl. 411-271.000.
Shatford, Walter T., III: *See*—
Shatford, Will; and Shatford, Walter T., III, 4,976,435, Cl. 273-148.00B.
Shatford, Will; and Shatford, Walter T., III. Video game control adapter. 4,976,435, Cl. 273-148.00B.
Shaw, Bon F.; Bond, Gary M.; and Fields, Randy R., to Fike Corporation. Threshold compensation and calibration in distributed environmental detection system for fire detection and suppression. 4,977,527, Cl. 364-571.030.
Shear, Victor H., to Electronic Publishing Resources, Inc. Database usage metering and protection system and method. 4,977,594, Cl. 380-4.000.
Sheen, Guang Y. Coupling portion of an outlet pipe of a tap. 4,976,287, Cl. 137-801.000.
Shell Oil Company: *See*—
Dewitz, Thomas S., 4,976,755, Cl. 55-161.000.
Hwo, Charles C.; and Mostert, Simone, 4,977,206, Cl. 524-504.000.
Lednor, Peter W., 4,977,125, Cl. 502-200.000.
Maxwell, Ian E.; and Biswass, Jaydeep, 4,976,847, Cl. 208-120.000.
Mitchell, Neil F.; and Djiauw, Lie K., 4,977,014, Cl. 428-220.000.
Van Der Scheer, Albert; and Werner, Jan, 4,976,856, Cl. 210-490.000.
Wang, Pen-Chung, 4,977,235, Cl. 528-220.000.
Shepherd, James E. Data acquisition device for balancing rotating components of large machinery. 4,977,516, Cl. 364-508.000.
Sherwood Medical Company: *See*—
Bodicky, Raymond O.; and Ranford, Alan B., 4,976,707, Cl. 604-408.000.
Shettigar, Udipi R.: *See*—
Lane, Perry L.; and Shettigar, Udipi R., 4,976,682, Cl. 604-4.000.
Shiba, Haruo; and Ikebe, Masaru, to TDK Corporation. Lining member for the surface of a casing for a disc cartridge. 4,977,475, Cl. 360-133.000.
Shiba, Keisuke: *See*—
Okazaki, Masaki; Yamamuro, Kiyohiko; Koizumi, Shigeo; and Shiba, Keisuke, 4,977,076, Cl. 430-583.000.
Shibamoto, Yuta: *See*—
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.
Shibuya America Corporation: *See*—
Hoffman, Wolfgang W., 4,976,798, Cl. 156-85.000.
Shibuya Kogyo Co., Ltd.: *See*—
Nakagawa, Ryoji, 4,977,512, Cl. 364-474.370.
Shigematsu, Nobuharu: *See*—
Okuhara, Masakuni; Goto, Toshio; Hori, Yasuhiro; Fujita, Takashi; Ueda, Hirotsugu; and Shigematsu, Nobuharu, 4,977,138, Cl. 514-10.000.
Shigemitsu, Fumiaki: *See*—
Masuda, Satoshi; Shigemitsu, Fumiaki; and Usuda, Kinya, 4,976,810, Cl. 156-659.100.
Shimada, Kazuyuki; Niito, Yoshiharu; Kiya, Yikitoshi; Yagishita, Takahiro; Miyamoto, Masayoshi; Azumai, Hideo; and Iwasaki, Keiichi, to Ricoh Company, Ltd. Image forming apparatus. 4,977,414, Cl. 346-154.000.
Shimada, Masahiko: *See*—
Ogawa, Akio; Shimada, Masahiko; and Ando, Kazuhiko, 4,977,201, Cl. 523-400.000.
Shimada, Takashi: *See*—
Kitahara, Koichi; Shimada, Takashi; Iwata, Keiichi; and Akitya, Noboru, 4,976,942, Cl. 423-294.000.
Shimada, Tetsuya; Itabashi, Satoshi; and Hatanaka, Katsunori, to Canon Kabushiki Kaisha. Method of making a photosensor using selective epitaxial growth. 4,977,096, Cl. 437-2.000.
Shimadzu Corporation: *See*—
Niwa, Takeshi, 4,977,314, Cl. 250-211.00R.
Shimamura, Eiji, to Kajima Corporation. Artificial ski slope. 4,976,422, Cl. 272-56.555.
Shimamura, Yoshiyuki, to Canon Kabushiki Kaisha. Document processor. 4,977,536, Cl. 364-900.000.
Shimizu, Akihiko: *See*—
Inoue, Kiyoshi; and Shimizu, Akihiko, 4,977,396, Cl. 340-706.000.
Shimizu, Atsushi: *See*—
Horiuchi, Makoto; Shimizu, Atsushi; Miyakawa, Yoshitaka; and Sakurai, Kazuya, 4,976,105, Cl. 60-413.000.
Shimizu, Hiromitsu: *See*—
Rikimaru, Hiroaki; Nakatsuji, Tadao; Umaba, Toshikatsu; Nagano, Kazuhiko; Mishina, Kazuya; and Shimizu, Hiromitsu, 4,977,127, Cl. 502-309.000.
Shimizu, Seiji: *See*—
Kuzuya, Susumu; Shimizu, Seiji; Kato, Mikio; Ishikawa, Yujiro; Sakai, Takashi; and Yuki, Eiji, 4,976,558, Cl. 400-615.200.
Shimizu, Toru: *See*—
Sakamura, Ken; Shimizu, Toru; Iwata, Shunichi; and Enomoto, Tatsuya, 4,977,497, Cl. 364-200.000.
Shiozawa, Shoji; and Shimizu, Toru, 4,977,041, Cl. 429-26.000.
Shimokawa, Kazuhiro: *See*—
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.
Shimokoriyama, Makoto: *See*—
Enari, Masahiko; Shimokoriyama, Makoto; and Fujii, Akio, 4,977,452, Cl. 358-138.000.
Shimomura, Soichi, to Nippon Piston Ring Co., Ltd. Method for producing ferrous sintered alloy product. 4,976,916, Cl. 419-25.000.
Shimosaka, Naoki, to NEC Corporation. Method and apparatus for stabilizing oscillation frequency separation among plural laser devices. 4,977,565, Cl. 372-32.000.
Shimosato, Masashi; Ochiai, Kuniaki; and Tsuyuki, Shinzi, to Tokyo Electric Company, Ltd. Release-type dot print head and method of manufacturing the same. 4,976,554, Cl. 400-124.000.
Shimura, Teruyuki, to Mitsubishi Denki Kabushiki Kaisha. Method of fabricating a MESFET. 4,977,100, Cl. 437-44.000.
Shin-Etsu Chemical Co., Ltd.: *See*—
Itoh, Kunio; Fukuda, Takeshi; and Nakamura, Tsutomu, 4,977,200, Cl. 523-223.000.

Kitamura, Hajime; Takeuchi, Masaru; and Yoshikoshi, Hideo, 4,976,540, Cl. 356-38.000.

Shincovich, John T.: *See*—
Langdon, Albert K.; Learmont, Robert O.; Robinson, Darrell; Goozen, Robert; Lewis, Michael; Williams, John; Pruehs, Allen V.; and Shincovich, John T., 4,977,482, Cl. 361-366.000.

Shindo, Nobuaki; Naruse, Seiji; Maeda, Fumiaki; Miyamoto, Yuujirou; and Takeuchi, Toshio, to Lion Corporation. Container. 4,976,369, Cl. 220-270.000.

Shinnick, Thomas; and Houghten, Richard, to Scripps Clinic and Research Foundation. Mycobacterial recombinants and peptides. 4,976,958, Cl. 424-92.000.

Shinohara, Satoru: *See*—
Fujiwara, Yoshio; Kobayashi, Naotake; Shinohara, Satoru; and Abe, Tetsuya, 4,977,136, Cl. 503-227.000.

Shinozaki, Keisuke: *See*—
Furukawa, Ryozo; Shinozaki, Keisuke; and Fukunaga, Toshiaki, 4,977,569, Cl. 372-50.000.

Shioiri, Noriaki: *See*—
Hasegawa, Hiroshi; Mogi, Kinichi; Shioiri, Noriaki; Sato, Susumu; and Katori, Tatsuhiko, 4,977,275, Cl. 548-539.000.

Shiomi, Makoto; Ohsawa, Michitaka; Sakamoto, Toshiyuki; Matsumi, Kuninori; Ozeki, Kosuke; Yuki, Ikuo; and Sato, Kenji, to Hitachi, Ltd.; and Hitachi Video Engineering, Inc. Digital convergence correcting apparatus. 4,977,446, Cl. 358-60.000.

Shionogi & Co., Ltd.: *See*—
Matsumoto, Saichi; Doteuchi, Masami; Mizui, Takuji; and Hirai, Kentaro, 4,977,170, Cl. 514-352.000.
Matsumura, Hiromu; Yano, Toshisada; Matsushita, Akira; and Eigyo, Masami, 4,977,167, Cl. 514-326.000.
Narisada, Masayuki; Ohtani, Mitsuaki; Watanabe, Fumihiko; Hagishita, Sanji; Seno, Kaoru; and Kamata, Susumu, 4,976,891, Cl. 260-401.000.

Shiozawa, Shoji; and Shimizu, Toru, to Ishikawajima-Harima Heavy Industries Co., Ltd. Fuel cell and method of ameliorating temperature distribution thereof. 4,977,041, Cl. 429-26.000.

Shirai, Akira: *See*—
Ohba, Hisao; Oda, Kazutaka; Sakaki, Hirokazu; Shirai, Akira; and Ohashi, Azusa, 4,976,198, Cl. 101-459.000.

Shiraishi, Kazuhiro: *See*—
Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, 4,976,241, Cl. 123-425.000.

Shiraishi, Yasuhiro, to Nissan Motor Co., Ltd. Indicator and method of indicating trouble. 4,977,389, Cl. 340-461.000.

Shiraiwa, Kimio: *See*—
Asakura, Masahiko; Shiraiwa, Kimio; Hattori, Yoichi; and Toume, Naotosi, 4,977,349, Cl. 313-490.000.

Shirakawa, Yoichi; Minowa, Yoshio; Azumi, Takayoshi; and Hisano, Junichi, to Asahi Denka Kogyo K.K. Process for producing protein-rich fish meal and fish oil. 4,976,973, Cl. 426-7.000.

Shobert, James P., to Plas/Steel Products, Inc. Expanded fiber-reinforced bearings. 4,976,550, Cl. 384-298.000.

Shoji, Tadao: *See*—
Oinuma, Hitoshi; Yamanaka, Motosuke; Miyake, Kazutoshi; Hoshiko, Tomonori; Minami, Norio; and Shoji, Tadao, 4,977,165, Cl. 514-318.000.

Shop-Vac Corporation: *See*—
Paige, Clive R., 4,976,467, Cl. 239-381.000.

Shorr, Leonard M.: *See*—
Herzlinger, Andrei; Shorr, Leonard M.; Antebi, Salomone; Morel-Fisher, Theodor; Utevski², Lev; and Scheinert, Yaakov, 4,977,262, Cl. 544-221.000.

Shors, Edwin C.: *See*—
White, Eugene W.; and Shors, Edwin C., 4,976,736, Cl. 623-16.000.

Short, William T.; and Hoerner, Rebecca S., to General Motors Corporation. Process of making thermoformable laminate films and processes. 4,976,896, Cl. 264-1.900.

Showa Alumi Powder Kabushiki Kaisha: *See*—
Ozawa, Sinya; Kondo, Katsumi; and Saito, Kajin, 4,976,777, Cl. 75-255.000.

Shpektorov, Iosif N.: *See*—
Kovalev, Evgeny P.; Sushkin, Alexandr M.; Trubakov, Venediktovich; Shpektorov, Vladimir N.; and Shpektorov, Iosif N., 4,976,051, Cl. 37-94.000.

Shpektorov, Vladimir N.: *See*—
Kovalev, Evgeny P.; Sushkin, Alexandr M.; Trubakov, Venediktovich; Shpektorov, Vladimir N.; and Shpektorov, Iosif N., 4,976,051, Cl. 37-94.000.

Shpigel, Vladimir, to Amrus Corporation. Connective joint with interlocking ring structures, adaptable for water conduction. 4,976,468, Cl. 239-587.000.

Shrier, Karen P. Overvoltage protection device and material. 4,977,357, Cl. 338-21.000.

Shrum, Durel B.: *See*—
Dobyns, Loren K.; Hanson, Gary S.; and Shrum, Durel B., 4,976,756, Cl. 55-341.100.

Shuert, Lyle H. Method and apparatus for transporting sheet metal stamping. 4,976,092, Cl. 53-475.000.

Siebert, Lester D., to Com-Pac International, Inc. Apparatus for sealing film including sealing head with wedge-shaped lower-portion. 4,976,811, Cl. 156-66.000.

Siecor Corporation: *See*—
Davila, Dan I.; Midkiff, John A.; and Ekanayake, Dulip, 4,976,510, Cl. 350-96.200.

Siegel, Brock M.: *See*—
Baldwin, William S.; Willging, Stephen M.; and Siegel, Brock M., 4,977,282, Cl. 549-412.000.

Siemens Aktiengesellschaft: *See*—
Bachmann, Andreas; and Carl, Arnd-Gunther, 4,976,509, Cl. 350-96.230.
Franetzki, Manfred; Funke, Helmut; and Schweiker, Eugen, 4,976,703, Cl. 604-247.000.
Hanke, Christian, 4,977,567, Cl. 372-45.000.
Hosten, Daniel, 4,976,840, Cl. 204-202.000.
Oliver, James D., Jr.; Biles, Kenneth A.; and Kasemset, Dumrong, 4,977,371, Cl. 324-158.00T.
Reichenberger, Helmut; Naser, Georg; and Schmidt, Erhard, 4,976,255, Cl. 128-24.00A.
Schiffers, Ulrich, 4,976,101, Cl. 60-39.120.
Stickel, Heinz; and Reihl, Peter, 4,976,358, Cl. 211-41.000.

Siemens Automotive L.P.: *See*—
Charles, Herbert N., 4,976,229, Cl. 123-90.170.

Siepser, Steven B. Device used to change corneal curvature. 4,976,719, Cl. 606-151.000.

Sieradzki, Karl; and Newman, Roger C. Micro- and nano-porous metallic structures. 4,977,038, Cl. 428-610.000.

Sig Schweitzerische Industrie-Gesellschaft: *See*—
Reichelt, Wolfgang, 4,976,089, Cl. 53-53.000.

Sigma Co., Ltd.: *See*—
Segoshi, Kazuo; Okuda, Toshiyuki; Okamura, Kenji; and Yoshida, Mizuo, 4,976,529, Cl. 351-41.000.

Silva, Felix: *See*—
Rodriguez, Domingo; Quintero, Lirio; Terrer, Maria T.; Jimenez, Euler; Silva, Felix; and Salazar, Jose, 4,976,745, Cl. 44-301.000.

Simasaki, Shuhei: *See*—
Yoshimura, Tatsushiro; Tomihashi, Nobuyuki; and Simasaki, Shuhei, 4,977,221, Cl. 525-356.000.

Simon, Jaime; Garlich, Joseph R.; Wilson, David A.; and McMillan, Kenneth, to Dow Chemical Company, The. Bone marrow suppressing agents. 4,976,950, Cl. 424-1.100.

Simon, Jean-Michel; Taniere, Jacques; Ciolczyk, Jean-Pierre; and Domer, Michel, to Hutchinson. Resilient support with anisotropic stiffnesses particularly for bodywork suspensions. 4,976,412, Cl. 248-634.000.

Simpson, Philip J.: *See*—
Homer, Nigel J.; Jackson, Graham; Sankey, George H.; and Simpson, Philip J., 4,977,254, Cl. 536-124.000.

Simpson, William H.: *See*—
Liang, Rong-Chang; Simpson, William H.; Gyure, Katherine A.; and Carpenter, Kenneth P., 4,977,059, Cl. 430-138.000.

Sinha, Uday F.: *See*—
Ward, George C.; Wilson, Thomas N.; and Sinha, Uday F., 4,977,037, Cl. 428-577.000.

Sirat, Gabriel; Dufresne, Eric; Charlot, Didier; and Maruani, Alain, to Etat Francais (Centre National d'Etudes des Telecommunications). Holographic method and apparatus using incoherent light. 4,976,504, Cl. 350-373.000.

Sivela, Seppo K.: *See*—
von Wright, Atte J.; Sivela, Seppo K.; and Tynkkynen, Soile S. H., 4,977,088, Cl. 435-252.300.

Siversson, Per-Erik, to Flodins Filter AB. Process for the production of filters, and a filter produced by the process. 4,976,677, Cl. 493-413.000.

Sivulka, Gerald M.; and Every, Peter, to Kelsey-Hayes Company. Fluid accumulator for use in a vehicle anti-lock brake system. 4,976,501, Cl. 303-113.000.

Sjoberg, Bengt E., to Saab-Scania Aktiebolag. Head-up display. 4,977,401, Cl. 340-975.000.

SKF GmbH: *See*—
Hans, Rudiger; and Winkler, Otmar, 4,976,659, Cl. 474-111.000.

Sklenak, John S.: *See*—
Adamski, Joseph R.; and Sklenak, John S., 4,976,749, Cl. 55-6.000.

Skogler, Brian: *See*—
Wickersham, Wayne M.; Wickersham, Colleen A.; Diener, Kevin G.; Diener, JoAnn S.; and Skogler, Brian, 4,976,448, Cl. 280-47.200.

Skold, Rolf; and Johansson, Irene, to Berol Kemi AB. Method for mechanically working cobalt-containing metal. 4,976,919, Cl. 422-7.000.

Skovhage, Erik; Jorgensen, Eskil B.; Nielsen, Per G.; and Sorensen, Christian B., to APV Pasilac A/S. Method for preparing prepressed cheese curd blocks and an assembly for carrying out said method. 4,976,981, Cl. 426-512.000.

SKW Trostberg Aktiengesellschaft: *See*—
Klima, Hubertus; Schutz, Erwin; and Vollbrecht, Heinz-Rudiger, 4,976,979, Cl. 426-427.000.

Slagel, Peter S.: *See*—
Casso, Christopher G.; Normore, Andrew D.; and Slagel, Peter S., 4,976,143, Cl. 73-151.500.

Sloan, Daniel C. Dispensing container with integral funnel. 4,976,379, Cl. 222-83.000.

Smith, Allen L. Tile saw apparatus and method. 4,976,251, Cl. 125-13.010.

Smith, Carol L., to Weyerhaeuser Company. Disposable elastic structure. 4,977,011, Cl. 428-152.000.

Smith Corona Corporation: *See*—
Longrod, Scott J., 4,976,556, Cl. 400-320.000.

Smith, David A.; Geiger, Herbert B.; and Dowell, Albert C., to Dow Brands Inc. Apparatus and method for the production of flexible bags. 4,976,673, Cl. 493-194.000.

Smith, David A., to ASTEC International Limited. Efficient snubber for rectifier circuits. 4,977,493, Cl. 363-126.000.

Smith, David W.; Cotter, David; and Wyatt, Richard, to British Telecommunications plc. Optical homodyne detection. 4,977,620, Cl. 455-619.000.

Smith, Gregory C., to Texas Instruments Incorporated. Tin chemical vapor deposition using TiCl4 and SiH4. 4,977,106, Cl. 437-192.000.

Smith, Hal W., Jr.: *See—*
Smith, Michael C.; and Smith, Hal W., Jr., 4,976,392, Cl. 228-102.000.

Smith, Hylton H.; and Foggin, Richard G., to Revolutionary Adhesive Materials, Ltd. Adhesive labels and methods for their manufacture. 4,977,006, Cl. 428-42.000.

Smith, Jack E., to General Motors Corporation. Wrap spring end attachment assembly for a twisted rope torsion bar. 4,976,417, Cl. 267-25.000.

Smith, Michael C.; and Smith, Hal W., Jr., to Orthodyne Electronics Corporation. Ultrasonic wire bonder wire formation and cutter system. 4,976,392, Cl. 228-102.000.

Smith, Norman C., to Galt Composites Limited. Securing tubes in inflatable boats. 4,976,213, Cl. 114-345.000.

Smith, R. Graham, to University of Texas System, The Board of Regents of the. Monoclonal antibodies to a broad range of mammalian terminal deoxynucleotidyl transferases. 4,977,086, Cl. 435-240.270.

Smith, R. Scott, to Ethyl Corporation. Catalyst composition for coupling process. 4,977,124, Cl. 502-174.000.

Smith, Terrance P.: *See—*
Jongewaard, Susan K.; Smith, Terrance P.; Leichter, Louis M.; and Zaklika, Krzysztof A., 4,977,134, Cl. 503-227.000.

Smith, William H., to Washington University. Digital array scanned interferometer. 4,976,542, Cl. 356-346.000.

Smouse, Dennis C.: *See—*
Anand, Vidhu; Houck, David L.; and Smouse, Dennis C., 4,976,948, Cl. 423-607.000.

SMS Schloemann-Siemag Aktiengesellschaft: *See—*
Setzer, Helmut; Sprenger, Axel; and Zeppenfeld, Josef, 4,976,129, Cl. 72-247.000.

Snamprogetti S.p.A.: *See—*
Soldati, Gian F., 4,976,849, Cl. 208-351.000.

Snelling, Jay B.: *See—*
Huffman, Dennis D.; Hughes, Robert C.; Kelsey, Charles A.; Lane, Richard; Ricco, Antonio J.; Snelling, Jay B.; and Zipperian, Thomas E., 4,976,266, Cl. 128-659.000.

Snyder, Robert F.; Ferguson, John H.; Meisterling, Jesse R.; and Fishman, David S., to Raymond Engineering Inc. Dual mode torque wrench. 4,976,159, Cl. 73-862.210.

Sobe, Alwin: *See—*
Block, Juergen; Feicho, Lutz; Sobe, Alwin; and Wischniewski, Martin, 4,976,965, Cl. 424-456.000.

Societe Anonyme dite: Compagnie Generale d'Automatisme CGA-HBS: *See—*
Lefevre, Jean Patrick, 4,977,501, Cl. 364-401.000.

Societe anonyme dite Hispano-Suiza: *See—*
Vauchel, Guy B., 4,976,466, Cl. 239-265.290.

Societe Anonyme: Sanofi: *See—*
Biziere, Kathleen; Wermuth, Camille G.; Worms, Paul; and Bourguignon, Jean-Jacques, 4,977,152, Cl. 514-232.800.

S.A.: Societe Europeenne de Propulsion: *See—*
Fouche, Claude, 4,976,177, Cl. 82-147.000.

Societe Charentaise de Participations, S.A.: *See—*
Temple, Robert, 4,977,031, Cl. 428-463.000.

Societe Nationale Elf Aquitaine: *See—*
Crozat, Georges; and Lebrun, Michel, 4,976,117, Cl. 62-480.000.

Soeda, Haruo: *See—*
Nagashima, Yasuo; Soeda, Haruo; Sato, Masamichi; and Kubo, Takashi, 4,976,020, Cl. 29-90.010.

Soejima, Tetsuo: *See—*
Iguchi, Kazuo; Soejima, Tetsuo; Watanabe, Toshiaki; and Amemiya, Shigeo, 4,977,558, Cl. 370-112.000.

Soga, Hiroh: *See—*
Akutsu, Eiichi; Soga, Hiroh; and Ando, Shigehito, 4,976,986, Cl. 427-27.000.

Soga, Setsuo, to Ricoh Company, Ltd. Heat roller type fixing device and method of producing the same. 4,977,308, Cl. 219-469.000.

Sogeva S.A.: *See—*
Clavel, Reymond, 4,976,582, Cl. 414-729.000.

Sogli, Loris: *See—*
Gementi, Francesco; Sogli, Loris; and Ungarelli, Raffaele, 4,977,291, Cl. 556-466.000.

Solar, Ronald J.; and Kagan, Jonathan, to SciMed Life Systems, Inc. Variable stiffness angioplasty catheter. 4,976,690, Cl. 604-96.000.

Solar, Ronald J.: *See—*
Buchbinder, Maurice; and Solar, Ronald J., 4,976,689, Cl. 604-95.000.

Soldati, Gian F., to Snamprogetti S.p.A. Fractionation process for gaseous hydrocarbon mixtures with a high acid gas content. 4,976,849, Cl. 208-351.000.

Solomon, Donald D.: *See—*
Walder, Anthony J.; Solomon, Donald D.; Beck, Richard W.; Lambert, James M.; Ignatius, Timothy; and Crawford, Mark, 4,976,697, Cl. 604-164.000.

Solomon, Donald F., to Newport Filters, Inc. Filter element and fabrication methodology. 4,976,857, Cl. 210-493.500.

Solomon, Stanley B. Cap and straw assembly for a water bottle. 4,976,364, Cl. 215-229.000.

Sonoda, Yukihiro; Osawa, Kouichi; Kanai, Hiroshi; Hoshi, Kouichi; Matsuoka, Hiroki; Ohashi, Michihiro; and Sawada, Hiroshi, to Toyota Jidosha Kabushiki Kaisha. Fuel injection control device of an engine. 4,976,242, Cl. 123-489.000.

Sontex, S.A.: *See—*
Challandes, Claude, 4,976,155, Cl. 73-861.190.

Sony Corporation: *See—*
Fujiwara, Yoshio; Kobayashi, Naotake; Shinohara, Satoru; and Abe, Tetsuya, 4,977,136, Cl. 503-227.000.
Furuya, Tsuneo; Furkawa, Shunsuke; and Hori, Katsuya, 4,977,550, Cl. 369-32.000.
Ichimura, Isao, 4,977,461, Cl. 358-336.000.
Takanashi, Kenji; and Wakisaka, Yoshiaki, 4,977,462, Cl. 358-339.000.

Soo, Yang K., to Hanil Industrial Co., Ltd. Heating system for vehicle. 4,976,463, Cl. 237-8.00C.

Sorensen, Christian B.: *See—*
Skovhage, Erik; Jorgensen, Eskil B.; Nielsen, Per G.; and Sorensen, Christian B., 4,976,981, Cl. 426-512.000.

Sosin, Boleslaw M.: *See—*
Sharma, Rakesh; and Sosin, Boleslaw M., 4,977,617, Cl. 455-319.000.

Sotomura, Tadashi: *See—*
Kondo, Shigeo; and Sotomura, Tadashi, 4,977,007, Cl. 428-76.000.

Southern Imperial, Inc.: *See—*
Valiulis, Stanley C., 4,976,058, Cl. 40-657.000.

Southwire Company: *See—*
Ward, George C.; Wilson, Thomas N.; and Sinha, Uday F., 4,977,037, Cl. 428-577.000.

Southworth, Donald R.: *See—*
Decker, James D.; Burch, Wendell D.; Brady, Daniel F.; Hinzman, Gary W.; Kromrey, Edward P.; Sanville, Katherine M.; Southworth, Donald R.; Chace, Mark S.; and Peloquin, Perry M., 4,976,137, Cl. 73-53.000.

Spectra-Physics, Inc.: *See—*
Ake, DuWain K., 4,976,538, Cl. 356-4.000.
Herbst, Richard L.; Alfrey, Anthony J.; and Streeby, Shawn D., 4,977,566, Cl. 372-33.000.
Ortiz, Mark V., 4,977,575, Cl. 372-103.000.

Spetsialnoe Konstruktorskoe Buro "Gazstroimashina": *See—*
Kovalev, Evgeny P.; Sushkin, Alexandr M.; Trubakov, Venediktovich; Shpektorov, Vladimir N.; and Shpektorov, Iosif N., 4,976,051, Cl. 37-94.000.

Spianti, Dany, to Sachtler AG Kommunikationstechnik. Body-mounted support. 4,976,387, Cl. 224-262.000.

Spielvogel, Bernard F.: *See—*
McPhail, Andrew T.; Spielvogel, Bernard F.; and Hall, Iris H., 4,977,268, Cl. 548-110.000.

Spier, I. Martin. Connector for corrugated materials. 4,976,567, Cl. 403-407.100.

Spiveco, Inc.: *See—*
Spivey, James R.; Dee, William J.; and Brice, William F., 4,976,562, Cl. 401-123.000.

Spivey, James R.; Dee, William J.; and Brice, William F., to Spiveco, Inc. Dispenser. 4,976,562, Cl. 401-123.000.

Spotts, James C.; and Chai, Haw R., to Australux North America Ltd. Solar powered outdoor recreational light with positionable solar panel. 4,977,488, Cl. 362-183.000.

Sprague, George; Herskowitz, Ira; Thorner, Jeremy; Julius, David; Blair, Lindley; and Brake, Anthony, to Univ. of California, The Board of Regents of the. Cloning and expression of yeast STE13 and Dpp2 genes encoding dipeptidyl aminopeptidase A and B. 4,977,085, Cl. 435-212.000.

Sprenger, Axel: *See—*
Setzer, Helmut; Sprenger, Axel; and Zeppenfeld, Josef, 4,976,129, Cl. 72-247.000.

Spruce, Lyle W.: *See—*
Berlin, Kenneth D.; Ford, Warren T.; Rajadhyaksha, Shirish N.; Gale, Jonathan B.; and Spruce, Lyle W., 4,977,276, Cl. 549-58.000.

Squire, Edward N., to E. I Du Pont de Nemours and Company. Amorphous copolymers of perfluoro-2,2-dimethyl-1,3-dioxole. 4,977,008, Cl. 428-35.700.

Squire, Edward N., to E. I Du Pont de Nemours and Company. Amorphous copolymers of perfluoro-2,2-dimethyl-1,3-dioxole. 4,977,025, Cl. 428-421.000.

Squire, Edward N., to Du Pont de Nemours, E. I., and Company. Amorphous copolymers of perfluoro-2,2-dimethyl-1,3-dioxole. 4,977,026, Cl. 428-422.000.

Squire, Edward N., to Du Pont de Nemours, E. I., and Company. Amorphous copolymers of perfluoro-2,2-dimethyl-1,3-dioxole. 4,977,297, Cl. 174-258.000.

Srinivasan, Padmanabhan: *See—*
Bargigia, Gianangelo; Re, Alberto; Corbelli, Luigi; Johns, Ken; Flabbi, Luciano; and Srinivasan, Padmanabhan, 4,977,222, Cl. 525-359.300.

SS Pharmaceutical Co., Ltd.: *See—*
Hasegawa, Hiroshi; Mogi, Kinichi; Shioiri, Noriaki; Sato, Susumu; and Katori, Tatsuhiko, 4,977,275, Cl. 548-539.000.

Stabilus GmbH: *See—*
Pohlenz, Hans; and Wagner, Gunter, 4,976,433, Cl. 273-73.00E.

Stabler, Manfred, to Robert Bosch GmbH. Clamping fixture for axially clamping a tool in place, in particular a disc. 4,976,071, Cl. 51-168.000.

Stack Electronics Co., Ltd.: *See—*
Kawada, Kazuo; and Oiwa, Yuichi, 4,977,481, Cl. 361-287.000.

Stafford, Joseph D.: *See—*
Durrett, Michael G.; Helms, David A.; Hatton, Gregory J.; Dowty, Earl L.; Marrelli, John D.; Stafford, Joseph D.; and Stavish, David J., 4,977,377, Cl. 324-640.000.

Stanadyne Automotive Corp.: *See—*
Janik, Leon P.; and Maxwell, M. Craig, 4,976,852, Cl. 210-86.000.

Standard Oil Company, The: *See—*
Cesa, Mark C.; Rinz, James E.; Klopman, Gilles; and Kopp, Teodora T., 4,977,272, Cl. 548-336.000.

Standard Products Company, The: *See—*
Keys, James F., 4,976,068, Cl. 49-482.000.

Stang, John H.; Moore, Christine H.; and Ouwerkerk, Rien, to Cummins Engine Company, Inc. Cylinder head gasket for an internal combustion engine. 4,976,225, Cl. 123-41.740.

Stasz, Peter: *See—*
Parins, David J.; Rydell, Mark A.; and Stasz, Peter, 4,976,711, Cl. 606-48.000.

Staudenmayer, William J.: *See—*
Agostinelli, John A.; and Staudenmayer, William J., 4,976,877, Cl. 219-216.000.

Stavish, David J.: *See—*
Durrett, Michael G.; Helms, David A.; Hatton, Gregory J.; Dowty, Earl L.; Marrelli, John D.; Stafford, Joseph D.; and Stavish, David J., 4,977,377, Cl. 324-640.000.

Stearns, Donald M., to PEC Research, Inc. Wastewater treatment process. 4,976,863, Cl. 210-608.000.

Steele, James R.; and Hardwicke, Redwell, to Dynamic Air, Inc. Tubing bend for pneumatic conveying system. 4,976,288, Cl. 138-120.000.

Stefan, Alexander. Draw bolt apparatus for countertop assemblage. 4,976,565, Cl. 403-8.000.

Stein, Dale P., to Texas Instruments, Inc. Integrated circuit to reduce switching noise. 4,977,341, Cl. 307-572.000.

Stein, Philip D.; and Hall, Steven E., to E. R. Squibb & Sons, Inc. 7-oxabicycloheptane imidazole prostaglandin analogs useful in the treatment of thrombotic and vasospastic disease. 4,977,174, Cl. 514-382.000.

Steiner, Hansruedi; and Weber, Hans, to W+E Umwelttechnik AG. Mechanism for the removal of slag in incineration plants. 4,976,206, Cl. 110-171.000.

Steiner, Solomon S., to Clinical Technologies Associates, Inc. Anhydrous delivery systems for pharmacological agents. 4,976,968, Cl. 424-491.000.

Steinheuser, Peter: *See—*
Dorband, Glen C.; Liland, Alfred; Menezes, Edgar; Steinheuser, Peter; Popadiuk, Nicholas M.; and Failla, Stephen J., 4,976,909, Cl. 264-235.000.

Steinmetz, Guy R.: *See—*
Agreda, Victor H.; and Steinmetz, Guy R., 4,976,947, Cl. 423-502.000.

Steri-Shield Products, Inc.: *See—*
Eisner, Mark R.; and Becker, Charlton D., 4,976,616, Cl. 433-77.000.

Stern & Stern Industries, Inc.: *See—*
Thornton, Peter B.; Cone, Stanley H.; and Booz, George W., 4,977,016, Cl. 428-225.000.

Sternitzke, Reinhard: *See—*
Mensing, Hermann; Sternitzke, Reinhard; Waldeck, Karl; and Schnabel, Klaus, 4,976,676, Cl. 493-365.000.

Stevens, E. Henry. Structure and process for contacting and interconnecting semiconductor devices within an integrated circuit. 4,977,440, Cl. 357-68.000.

Stevenson, John: *See—*
Barker, Sidney A.; Baggett, Neil; Stevenson, John; George, Raymond D.; De Courcy, David R.; Hammond, Timothy; and Bradley, Martin, 4,977,209, Cl. 524-594.000.

Stevenson, Paul E.: *See—*
Yoder, Douglas J.; Brown, Ronald E.; Stevenson, Paul E.; Hornback, Donald L.; and Leisure, Ronald K., 4,977,101, Cl. 437-51.000.

Stickel, Heinz; and Reihl, Peter, to Siemens Aktiengesellschaft. Apparatus for guiding and holding printed circuit boards. 4,976,358, Cl. 211-41.000.

Stiga Aktiebolag: *See—*
Wikner, Erland, 4,976,434, Cl. 273-85.00B.

Stimpson, Cynthia C. Novelty clothing. 4,975,985, Cl. 2-115.000.

Sting, Betty J., to Betty Sting Patient Gowns, Inc. One-piece garment. 4,975,984, Cl. 2-114.000.

Stock, Burkhard, to Dragerwerk Aktiengesellschaft. Apparatus and method for detecting gas components. 4,976,135, Cl. 73-23.200.

Stockel, Elfriede; and Buchan, Cynthia L., to Chemco Technologies, Inc. Surface composition for a substrate and method of preparation. 4,976,997, Cl. 427-380.000.

Stoermer, Ralph T., III; and Darner, James C., to Becton, Dickinson and Company. Generation of anaerobic or microaerophilic atmosphere. 4,976,931, Cl. 422-211.000.

Stohler, Harro: *See—*
Hofheinz, Werner; Schmid, Gerard; and Stohler, Harro, 4,977,184, Cl. 514-452.000.

Stokley, Manuel H. Intravenous catheter and tubing stabilization device. 4,976,698, Cl. 604-174.000.

Stoll, Andre: *See—*
Louis, William J.; Berthold, Richard; Seiler, Max-Peter; and Stoll, Andre, 4,977,153, Cl. 514-237.500.

Stolz, Gerhard: *See—*
Muendlein, Werner; Scheer, Gerhard; and Stolz, Gerhard, 4,976,574, Cl. 409-232.000.

Stone, Roger J.: *See—*
Aldridge, Billie A., Jr.; and Stone, Roger J., 4,976,025, Cl. 29-563.000.

Stork Friesland B.V.: *See—*
Yntema, Everardus G. M., 4,976,980, Cl. 426-495.000.

Stormax International A/S: *See—*
Schultz, Gert, 4,976,597, Cl. 425-126.200.

Stratton, William; and Wellington, Carol, to Unisys Corporation. System and method for accessing a cache memory which is located in the main memory of a large data processing system. 4,977,495, Cl. 364-200.000.

Straus, Daniel A.; and Babashak, John F., to Kontes Glass Company. Solvent storage flask. 4,976,927, Cl. 422-102.000.

Streeby, Shawn D.: *See—*
Herbst, Richard L.; Alfrey, Anthony J.; and Streeby, Shawn D., 4,977,566, Cl. 372-33.000.

Strege, Timothy A.; and Schmieley, Donald A., to Hunter Engineering Company. Electronic measuring gauge and apparatus for accurate vehicle stance diagnosis and guidance in effecting wheel alignment. 4,977,524, Cl. 364-562.000.

Stribling, Donald: *See—*
Holloway, Brian R.; Howe, Ralph; Rao, Balbir S.; and Stribling, Donald, 4,977,148, Cl. 514-183.000.

Stromberg-Carlson Products, Inc.: *See—*
Brammer, Robert C., Sr.; and Brammer, Robert C., Jr., 4,976,455, Cl. 280-762.000.

Stromblad, Mats: *See—*
Dahlgren, Arthur; Kallrot, Magnus; and Stromblad, Mats, 4,976,313, Cl. 165-167.000.

Strongwater, Murray. Means for removably securing accessories to wearing apparel and the like. 4,975,986, Cl. 2-160.000.

Strotz, Marcel: *See—*
Studer, Werner; Hagmann, Stefan; and Strotz, Marcel, 4,977,310, Cl. 235-375.000.

Strowe, Robert J.: *See—*
Sanderson, George; and Strowe, Robert J., 4,976,696, Cl. 604-154.000.

Studer, Werner; Hagmann, Stefan; and Strotz, Marcel, to LGZ Landis & Gyr Zug. Programmable control or regulating device. 4,977,310, Cl. 235-375.000.

Stumpf, Robert C.: *See—*
Correa, Jose L.; Stumpf, Robert C.; Farnum, Charles L.; and Roos, Leo, 4,976,817, Cl. 156-555.000.

Subsidiary of Newman Tonks, Inc. Monarch Hardware & Manufacturing Co., Inc.: *See—*
Cross, David C.; and Holloway, William G., 4,976,476, Cl. 292-92.000.

Sudilovsky, Abraham, to E. R. Squibb & Sons, Inc. Method for preventing or treating depression employing an ace inhibitor. 4,977,145, Cl. 514-91.000.

Sudou, Yuko: *See—*
Ogata, Teruaki; and Sudou, Yuko, 4,977,531, Cl. 364-580.000.

Suga, Yoichi: *See—*
Saitou, Mitsuo; and Suga, Yoichi, 4,977,074, Cl. 430-567.000.

Sugano, Mamoru: *See—*
Fujimori, Shinichiro; Yamazaki, Satoshi; Sugano, Mamoru; Kawamura, Makoto; Ninomiya, Kunihiro; Tobe, Akihiro; and Nitta, Issei, 4,977,151, Cl. 514-225.500.

Suganuma, Yoshimi, to Fuji Photo Film Co., Ltd. Picture card and method of making the same. 4,977,061, Cl. 430-203.000.

Sugawara, Tomoo; and Yamato, Motoyuki. Process for production of molded article of norbornene polymer. 4,977,226, Cl. 526-122.000.

Sugimori, Teruhiko; Suzuki, Fumio; Habara, Hideaki; and Inada, Hiromasa, to Mitsubishi Rayon Company, Ltd. Particulate polymer and preparation process thereof. 4,977,241, Cl. 528-497.000.

Suginaka, Yutaka; and Taniguchi, Shigeru, to Meiji Milk Products Co., Ltd. Centrifugal separator. 4,976,678, Cl. 494-68.000.

Sui, Masahiro, to Pioneer Electronic Corporation. Tape recorder with deceleration control for capstan motor during connection recording. 4,977,465, Cl. 360-33.100.

Sukawa, Hiroshi; Hirose, Sumio; Takahara, Shigeru; and Sasakawa, Tomoyoshi, to Mitsui Toatsu Chemicals, Incorporated; and Yamamoto Chemicals, Incorporated. Optical recording medium and process for fabricating the same. 4,977,064, Cl. 430-270.000.

Sullivan, Donald K.: *See—*
Rawlings, David E.; and Sullivan, Donald K., 4,976,639, Cl. 440-59.000.

Sultanbaev, Beibyt E.: *See—*
Gilmanov, Murat K.; Dilbarkanova, Rsai; and Sultanbaev, Beibyt E., 4,977,091, Cl. 435-271.000.

Sulzer Brothers Limited: *See—*
Frey, Otto; Semlitsch, Manfred; and Weber, Heinz, 4,976,738, Cl. 623-16.000.
Willert, Hans-Georg; and Burgi, Maja, 4,976,728, Cl. 623-22.000.

Sumitomo Cement Co., Ltd.: *See—*
Iwamoto, Nobuya; Umesaki, Norimasa; Hidaka, Hiroaki; and Haibara, Yukio, 4,976,806, Cl. 156-325.000.

Sumitomo Chemical Company, Limited: *See—*
Horinouchi, Kazuo; and Maeda, Katsuya, 4,977,114, Cl. 501-104.000.
Kayane, Yutaka; Omura, Takashi; Harada, Naoki; Mori, Yasuji; Yamamoto, Yosuke; Miyamoto, Tetsuya; and Kusumoto, Takehiro, 4,977,261, Cl. 544-199.000.
Maeda, Takayoshi; Hata, Masahiko; Zempo, Yasunari; Fukuhara, Noboru; and Takata, Hiroaki, 4,976,216, Cl. 118-728.000.

Sakaki, Masaharu; and Yamazaki, Hiroko, 4,976,775, Cl. 71-106.000.
Sumitomo Electric Industries, Ltd.: *See*—
Okura, Toshihiko; Hirao, Kouji; Watanabe, Tetsuaki; and Kashihara, Kouji, 4,976,508, Cl. 350-96.230.
Sawada, Kazuo, 4,976,792, Cl. 148-404.000.
Sumitomo Metal Mining Company Limited: *See*—
Ogasawara, Shuichi, 4,976,808, Cl. 156-638.000.
Sumitomo Rubber Industries, Limited: *See*—
Kemp, Ian, 4,976,498, Cl. 301-95.000.
Takehara, Kenji; and Saitou, Kenji, 4,976,300, Cl. 152-454.000.
Summagraphics Corporation: *See*—
Purcell, Alexander M., 4,977,315, Cl. 250-221.000.
Sundstrand Corporation: *See*—
Kirchberg, Maurice A., Jr.; and Cook, Alexander, 4,977,492, Cl. 363-41.000.
White, R. C., 4,977,332, Cl. 307-113.000.
Sunkara, Sai P.: *See*—
Parker, Roger A.; and Sunkara, Sai P., 4,977,185, Cl. 514-473.000.
Sunohara, Kazuyuki: *See*—
Takatoh, Kohki; Sakamoto, Masanori; and Sunohara, Kazuyuki, 4,976,887, Cl. 252-299.620.
Sunseri, Ronald H.; and O'Rourke, Michael W., to Copolymer Rubber & Chemical Corporation. Polyesters having improved impact strength. 4,977,217, Cl. 525-286.000.
Suntory Limited: *See*—
Fukami, Harukazu; Higuchi, Naoki; Kawaguchi, Naoko; Hashimoto, Masaki; Ide, Kinya; and Takahashi, Toshio, 4,976,773, Cl. 71-94.000.
Supernaw, Irwin R., to Texaco Inc. Method for determining oil content of an underground formation. 4,977,319, Cl. 250-255.000.
Surko, Walter E., Jr.: *See*—
Dixon, David; and Surko, Walter E., Jr., 4,976,480, Cl. 292-353.000.
Sushkin, Alexandr M.: *See*—
Kovalev, Evgeny P.; Sushkin, Alexandr M.; Trubakov, Venediktovich; Shpektorov, Vladimir N.; and Shpektorov, Iosif N., 4,976,051, Cl. 37-94.000.
Sutera, Richard, to Mead Corporation, The. Non-pressure dry glossing of resin-coated sheets and web material. 4,976,993, Cl. 427-161.000.
Sutton, Gary. Disposal of waste material. 4,975,989, Cl. 4-300.000.
Suzuki Akira: *See*—
Hashimoto, Kiroyuki; Iizuka, Nobuo; and Suzuki Akira, 4,977,608, Cl. 425-62.000.
Suzuki, Fumio: *See*—
Sugimori, Teruhiko; Suzuki, Fumio; Habara, Hideaki; and Inada, Hiromasa, 4,977,241, Cl. 528-497.000.
Suzuki, Haruo; and Gotoh, Hiroya, to Jidosha Kiki Co., Ltd. Brake booster. 4,976,188, Cl. 91-369.200.
Suzuki, Hirohisa; Kabashima, Akira; Yamagishi, Mikio; and Ogawa, Ryuichi, to Sanyo Electric Co., Ltd. Diversity receiver. 4,977,615, Cl. 455-277.000.
Suzuki, Hiroo: *See*—
Kudo, Shigeji; Suzuki Sanae; Mirota, Hideaki; and Suzuki, Hiroo, 4,976,294, Cl. 140-102.000.
Suzuki, Hitoshi: *See*—
Nakajima, Makoto; Ohashi, Yoshio; Chuma, Toshio; Hatori, Kazuo; Araki, Isao; Koizumi, Masahiro; Onuki, Jin; Suzuki, Hitoshi; and Okikawa, Susumu, 4,976,393, Cl. 228-111.000.
Suzuki Jidosha Kogyo Kabushiki Kaisha: *See*—
Taniguchi, Katuhico, 4,976,595, Cl. 418-171.000.
Suzuki Jidosha Kogyo Kabushiki Kisha: *See*—
Toyoda, Katsuhiko, 4,976,238, Cl. 123-339.000.
Suzuki, Junji; Ishida, Tatsuya; Toda, Kazuya; Ikeda, Tatsufumi; Tsukidate, Yokichi; and Yasuo, Kikuchi, to Yashima Chemical Industrial Co., Ltd. Oxa- or thia-zoline derivative. 4,977,171, Cl. 514-365.000.
Suzuki, Masayoshi; and Horii, Hidesato, to Hitachi, Ltd.; and Hitachi Automotive Engineering, Ltd. Power semiconductor device including an arrangement for controlling load current by independent control of a plurality of semiconductor elements. 4,977,333, Cl. 307-243.000.
Suzuki, Masayoshi: *See*—
Akamatsu, Masuo; and Suzuki, Masayoshi, 4,976,140, Cl. 73-118.200.
Suzuki, Mikio: *See*—
Fujikawa, Yoshihiro; Suzuki, Mikio; Iwasaki, Hiroshi; Sakashita, Mitsuaki; and Kitahara, Masaki, 4,977,161, Cl. 514-302.000.
Suzuki Motor Company Limited: *See*—
Asai, Keiichi; Mochizuki, Chizuko; and Hori, Kazunobu, 4,976,488, Cl. 296-155.000.
Suzuki, Sadakatsu; Inagaki, Hiroyuki; and Ueno, Hiroshi, to Tonen Corporation. Process for producing 1,4-butanediol and tetrahydrofuran. 4,977,284, Cl. 549-508.000.
Suzuki Sanae: *See*—
Kudo, Shigeji; Suzuki Sanae; Mirota, Hideaki; and Suzuki, Hiroo, 4,976,294, Cl. 140-102.000.
Suzuki, Takao: *See*—
Ishizuka, Shinichi; Suzuki, Takao; Umesato, Shoji; and Okada, Yoshikatsu, 4,976,624, Cl. 439-70.000.
Suzuki, Takeshi: *See*—
Ohta, Mitsuaki; Koide, Tokuo; Suzuki, Takeshi; Matsuhisa, Akira; Yanagisawa, Isao; and Miyata, Keiji, 4,977,175, Cl. 514-394.000.
Suzuki, Toshiaki; Murakami, Yoji; Kobayashi, Masao; and Yamauchi, Osamu, to Fujitsu Limited. Lead frame and method of producing electronic components using such improved lead frame. 4,977,442, Cl. 357-70.000.
Suzuki, Toshifumi: *See*—
Hashimoto, Teruo; Fukushima, Yoshio; Suzuki, Toshifumi; and Minamoto, Hiroshi, 4,976,491, Cl. 296-192.000.
Suzumori, Koichi; Matsumaru, Takafumi; and Iikura, Shoichi, to Kabushiki Kaisha Toshiba. Elastically deformable fluid actuator. 4,976,191, Cl. 92-48.000.
Svilar, Mark: *See*—
Berry, David F.; Klar, Erhard; and Svilar, Mark, 4,976,778, Cl. 75-254.000.
Swartz, Roger E.: *See*—
Post, Charles C.; and Swartz, Roger E., 4,976,497, Cl. 301-37.00R.
Swenson, Paul F., to Consolidated Natural Gas Service Company, Inc. Fuel-fired heat pump system. 4,976,464, Cl. 237-81.000.
Swiss Aluminium Ltd.: *See*—
Maly, Zdenek, 4,976,827, Cl. 204-15.000.
Synthelabo: *See*—
Sevrin, Mireille; George, Pascal; Menin, Jacques; Morel, Claude; and Bigg, Dennis, 4,977,159, Cl. 514-292.000.
Sysgration Ltd.: *See*—
Kuo, Wen-Chieh; Lin, Chia-Hui; Chou, Te-Chang; and Liang, Yuan-Hsiung, 4,977,397, Cl. 340-710.000.
Szabo, Edith, executrix: *See*—
Szabo, Louis, deceased; Morariu, Gavril; and Banister, Eric W., 4,976,426, Cl. 272-130.000.
Szabo, Louis, deceased (Szabo, Edith, executrix); Morariu, Gavril; and Banister, Eric W., to Garden Reach Developments Ltd. Rehabilitation exercise device. 4,976,426, Cl. 272-130.000.
Szydlowski, Donald F.; and Lesieur, Roger R., to International Fuel Cells Corporation. Fuel treatment apparatus for fuel cells. 4,976,747, Cl. 48-127.900.
Ta, Larry: *See*—
Chia, Meang; and Ta, Larry, 4,976,033, Cl. 30-366.000.
Tabata, Yujin: *See*—
Ohba, Noriaki; Tabata, Yujin; Nagatsuka, Masaaki; Nagatomi, Tateyuki; and Klicker, Helmut, 4,976,743, Cl. 8-543.000.
Tabuse, Hidetoshi: *See*—
Matsuoka, Hirofumi; and Tabuse, Hidetoshi, 4,977,507, Cl. 364-424.050.
Tachibana, Hideki: *See*—
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; Tachibana, Hideki; and Tanase, Setsumi, 4,976,706, Cl. 604-304.000.
Tachibana Textile Fabrics, Co., Ltd.: *See*—
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; Tachibana, Hideki; and Tanase, Setsumi, 4,976,706, Cl. 604-304.000.
Tacquard, Timothy L.; and Gillfillan, Patricia B., to Patail Enterprises, Inc. Device for creating and displaying moire patterns. 4,976,620, Cl. 434-81.000.
Tadahiro, Ohmi: *See*—
Hiratsuka, Yutaka; Ohmi, Tadahiro; Murota, Junichi; Fujisaki, Yoshio; Noda, Masato; Kitada, Yoshimitsu; and Sahara, Terutaka, 4,976,815, Cl. 156-345.000.
Tagawa, Akihiko: *See*—
Hangai, Toshimasa; Ishitoya, Koichi; and Tagawa, Akihiko, 4,977,554, Cl. 369-215.000.
Tagawa Kikai Co., Ltd.: *See*—
Matsumoto, Hiroyasu, 4,976,292, Cl. 139-194.000.
Tagaya, Nobuaki: *See*—
Sakurada, Satoshi; Tagaya, Nobuaki; Miura, Tadashi; Maeshima, Tsugio; and Hashimoto, Takao, 4,977,120, Cl. 502-64.000.
Taira, Masamichi: *See*—
Amano, Shigeru; Takarabe, Tsuyoshi; Oda, Hiroshi; Nakamori, Takashi; Watanabe, Satoshi; and Taira, Masamichi, 4,976,780, Cl. 75-375.000.
Taisho Pharmaceutical Co., Ltd.: *See*—
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.
Tajima, Sadayoshi, to Hitachi, Ltd. Rolling mill and method of exchanging rolls of rolling mill. 4,976,128, Cl. 72-238.000.
Takabatake, Hideo, to Yoshida Kogyo K.K. Separable slide fastener. 4,976,016, Cl. 24-433.000.
Takada, Nobuharu; and Hirosaki, Toshihiko, to Mitsubishi Denki Kabushiki Kaisha. Overheat preventing system of A.C. motor. 4,977,363, Cl. 318-771.000.
Takada, Seiji: *See*—
Kotani, Takaaki; and Takada, Seiji, 4,976,537, Cl. 356-1.000.
Takagi, Hiroshi: *See*—
Mori, Yoshiaki; Takagi, Hiroshi; and Sakabe, Yukio, 4,977,485, Cl. 361-321.000.
Takagi, Isao: *See*—
Hosoya, Yoshio; Watanabe, Naotaka; Takagi, Isao; and Miyoshi, Atsuo, 4,977,208, Cl. 524-515.000.
Takagi, Yoshio: *See*—
Ito, Hiroshi; Handa, Junichi; Takagi, Yoshio; and Minohara, Taketoshi, 4,976,787, Cl. 106-441.000.
Takahama, Atsushi: *See*—
Nomaru, Minoru; and Takahama, Atsushi, 4,976,484, Cl. 294-119.100.
Takahara, Shigeru: *See*—
Sukawa, Hiroshi; Hirose, Sumio; Takahara, Shigeru; and Sasakawa, Tomoyoshi, 4,977,064, Cl. 430-270.000.
Takahashi, Eiji, to Calsonic Corporation. Air conditioner for automobiles. 4,976,461, Cl. 236-13.000.

Takahashi, Hiromasa, to Fujitsu Limited. Operation circuit based on floating-point representation with selective bypass for increasing processing speed. 4,977,534, Cl. 364-748.000.

Takahashi, Hiromichi; and Tsujii, Kaoru, to KAO Corporation. Conjugated polymer-cation exchanger composite membrane. 4,976,860, Cl. 210-500.280.

Takahashi, Hiroyasu: *See*—
Tsunoda, Takeo; Takeo, Setsu; Nobusawa, Tatsuya; Enomoto, Norihide; Takahashi, Hiroyasu; Watanabe, Minoru; Sasaki, Yutaka; and Tanaka, Kunihiro, 4,976,941, Cl. 423-247.000.

Takahashi, Masanori: *See*—
Torigai, Katsumi; and Takahashi, Masanori, 4,976,636, Cl. 440-1.000.

Takahashi, Miyoko: *See*—
Raybould, Torquil J. G.; and Takahashi, Miyoko, 4,977,081, Cl. 435-70.210.

Takahashi, Tadashi: *See*—
Niimura, Toshinobu; Takahashi, Tadashi; Kashiba, Mutsuro; Sakai, Ko; and Kano, Tokio, 4,977,078, Cl. 435-7.000.

Takahashi, Takeshi; and Itatsu, Toshiro, to Toyota Jidosha Kabushiki Kaisha. Unit injector. 4,976,245, Cl. 123-506.000.

Takahashi, Toshio: *See*—
Fukami, Harukazu; Higuchi, Naoki; Kawaguchi, Naoko; Hashimoto, Masaki; Ide, Kinya; and Takahashi, Toshio, 4,976,773, Cl. 71-94.000.

Takahashi, Yoshinori: *See*—
Murai, Nobuyoshi; Takahashi, Yoshinori; and Katayama, Kazuyoshi, 4,976,415, Cl. 267-136.000.

Takanashi, Itsuo; Ichitou, Toshikatsu; Kitamura, Hiroki; Yamamura, Takashi; Sakagami, Koubun; and Nakano, Atsushi, to Victor Company of Japan, Ltd. Electrophotography system. 4,977,417, Cl. 346-160.000.

Takanashi, Kenji; and Wakisaka, Yoshiaki, to Sony Corporation. Apparatus for correcting a time base error in a video signal. 4,977,462, Cl. 358-339.000.

Takano, Hiroshi, to Mitsuboshi Belting Ltd. Belt-type stepless speed shifting apparatus. 4,976,657, Cl. 474-13.000.

Takano, Yukio: *See*—
Motoi, Yoshihiko; Yamamoto, Naoki; and Takano, Yukio, 4,977,307, Cl. 219-392.000.

Takaoka, Kenji: *See*—
Hayama, Masaharu; Takaoka, Kenji; Torai, Yasushi; and Fukada, Toshiharu, 4,976,116, Cl. 62-441.000.

Takarabe, Tsuyoshi: *See*—
Amano, Shigeru; Takarabe, Tsuyoshi; Oda, Hiroshi; Nakamori, Takashi; Watanabe, Satoshi; and Taira, Masamichi, 4,976,780, Cl. 75-375.000.

Takase, Haruo; Uenaka, Kazushige; Abf, Akira; and Fujita, Yoshihiro, to Fuji Photo Film Co., Ltd. Wash water reservoiring method. 4,976,870, Cl. 210-668.000.

Takashima, Hideki: *See*—
Murayama, Junichi; Iiyama, Kazuto; Toyama, Niichi; Sadamitsu, Katsushi; and Takashima, Hideki, 4,977,000, Cl. 427-424.000.

Takata, Hiroaki: *See*—
Maeda, Takayoshi; Hata, Masahiko; Zempo, Yasunari; Fukuhara, Noboru; and Takata, Hiroaki, 4,976,216, Cl. 118-728.000.

Takatoh, Kohki; Sakamoto, Masanori; and Sunohara, Kazuyuki, to Kabushiki Kaisha Toshiba. Optically active liquid crystal compound and method of manufacturing the same, liquid crystal composition containing the same and liquid crystal display device. 4,976,887, Cl. 252-299.620.

Takayama, Yukio: *See*—
Ishida, Kouichi; Nakamura, Mikio; and Takayama, Yukio, 4,977,133, Cl. 503-226.000.

Takeda Chemical Industries, Ltd.: *See*—
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; and Mikami, Nakao, 4,976,705, Cl. 604-304.000.
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; Tachibana, Hideki; and Tanase, Setsumi, 4,976,706, Cl. 604-304.000.
Tsujimoto, Yasuhiro; Kurita, Masayuki; and Aoki, Masaru, 4,976,473, Cl. 242-67.10R.

Takeda, Eiji: *See*—
Yoshimura, Toshiyuki; Takeda, Eiji; Matsuoka, Hideyuki; and Igura, Yasuo, 4,977,435, Cl. 357-23.500.

Takehara, Hiroshi: *See*—
Ihama, Mikio; Kume, Yuji; Tamoto, Koji; Takehara, Hiroshi; and Arai, Masao, 4,977,075, Cl. 430-567.000.

Takehara, Kenji; and Saitou, Kenji, to Sumitomo Rubber Industries, Ltd. Pneumatic tire profile. 4,976,300, Cl. 152-454.000.

Takemura, Hitoshi: *See*—
Kawamura, Takao; Miyamoto, Naooki; Ito, Hiroshi; Takemura, Hitoshi; and Ishibutsu, Kokichi, 4,977,050, Cl. 430-57.000.

Takemura, Jun: *See*—
Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, 4,976,241, Cl. 123-425.000.

Takenaka Corporation, A Japanese Corporation: *See*—
Murai, Nobuyoshi; Takahashi, Yoshinori; and Katayama, Kazuyoshi, 4,976,415, Cl. 267-136.000.

Takenaka, Shigeo; Kamohara, Eiji; and Nishimura, Takashi, to Kabushiki Kaisha Toshiba. Color cathode ray tube. 4,977,447, Cl. 358-66.000.

Takenouchi, Masanori: *See*—
Miyagawa, Masashi; Takenouchi, Masanori; and Ohkuma, Norio, 4,977,058, Cl. 430-138.000.

Takeo, Setsu: *See*—
Tsunoda, Takeo; Takeo, Setsu; Nobusawa, Tatsuya; Enomoto, Norihide; Takahashi, Hiroyasu; Watanabe, Minoru; Sasaki, Yutaka; and Tanaka, Kunihiro, 4,976,941, Cl. 423-247.000.

Takeshi, Kunio: *See*—
Oshima, Shigeru; and Takeshi, Kunio, 4,976,526, Cl. 350-463.000.

Takeuchi, Masaru: *See*—
Kitamura, Hajime; Takeuchi, Masaru; and Yoshikoshi, Hideo, 4,976,540, Cl. 356-38.000.

Takeuchi, Toshio: *See*—
Shindo, Nobuaki; Naruse, Seiji; Maeda, Fumiaki; Miyamoto, Yuujirou; and Takeuchi, Toshio, 4,976,369, Cl. 220-270.000.

Takeuchi, Tuneto: *See*—
Sawai, Kenji; Takeuchi, Tuneto; and Ito, Jinichi, 4,977,359, Cl. 318-561.000.

Takikawa, Kazunori; and Serizawa, Haruo, to Usui Kokusai Sangyo Kabushiki Kaisha. Metal-made carrier body for carrying thereon exhaust gas cleaning catalyst. 4,976,103, Cl. 60-299.000.

Takizawa, Shozo: *See*—
Hara, Mitsuhiko; Takizawa, Shozo; Tanaka, Tadao; Taniguchi, Yasutaka; Wada, Shunichi; and Ohtagaki, Shigeki, 4,977,506, Cl. 364-424.050.

Takuma, Kazunori: *See*—
Yazaki, Takashi; and Takuma, Kazunori, 4,977,157, Cl. 514-258.000.

Tamai, Kazuhiko: *See*—
Wakabayashi, Hiroshi; Iwakiri, Hisami; Tamai, Kazuhiko; and Isayama, Katsuhiko, 4,977,228, Cl. 528-12.000.

Tamekuni, Yasuhiro; Amikura, Takashi; and Ohara, Toru, to Canon Kabushiki Kaisha. Autofocus device for determining an in-focus and real in-focus state. 4,977,457, Cl. 358-227.000.

Tamglass Oy: *See*—
Anttonen, Kauko K., 4,976,762, Cl. 65-107.000.

Tamiya, Fumiyuki: *See*—
Fukuoka, Mitsuhiro; Kobayashi, Nobuaki; and Tamiya, Fumiyuki, 4,976,564, Cl. 401-206.000.

Tamoto, Koji: *See*—
Ihama, Mikio; Kume, Yuji; Tamoto, Koji; Takehara, Hiroshi; and Arai, Masao, 4,977,075, Cl. 430-567.000.

Tamworth Plastics Limited: *See*—
Wright, Charles W., 4,976,001, Cl. 15-250.200.

Tan, Loon S.: *See*—
Arnold, Fred E.; Helminiak, Thaddeus E.; Wiff, Donald R.; Tan, Loon S.; Hwang, Wen F.; and Chuah, Hoe, 4,977,223, Cl. 525-432.000.

Tanaka, Hiroshi: *See*—
Hayashi, Kiyotaka; Handa, Etsumi; Yamamoto, Yorihisa; and Tanaka, Hiroshi, 4,976,170, Cl. 74-866.000.

Tanaka, Hiroyuki: *See*—
Ino, Masumitsu; Kohata, Mitsuhiro; Itagaki, Masanori; Nagata, Takehito; and Tanaka, Hiroyuki, 4,977,304, Cl. 250-208.100.

Tanaka, Koichi; Yamashita, Takuo; Yamaue, Satoshi; and Nakaya, Hiroaki, to Sharp Kabushiki Kaisha. Color electroluminescence display panel having alternately-extending electrode groups. 4,977,350, Cl. 313-505.000.

Tanaka, Kouji; Kondo, Syugo; Imura, Takeshi; Ando, Katsuhiko; and Nakabayashi, Shigemitsu, to Honda Giken Kogyo Kabushiki Kaisha. Method of and apparatus for controlling die temperature in low-pressure casting process. 4,976,305, Cl. 164-458.000.

Tanaka, Kunihiro: *See*—
Tsunoda, Takeo; Takeo, Setsu; Nobusawa, Tatsuya; Enomoto, Norihide; Takahashi, Hiroyasu; Watanabe, Minoru; Sasaki, Yutaka; and Tanaka, Kunihiro, 4,976,941, Cl. 423-247.000.

Tanaka, Naoyuki; Nakamura, Yozo; Arai, Akira; Nakamura, Mitsuru; Endo, Tsunehiro; and Kadomukai, Yuzo, to Hitachi, Ltd. Internal combustion engine equipped with a torque controller. 4,977,508, Cl. 364-431.080.

Tanaka, Satoru: *See*—
Murata, Yasushi; and Tanaka, Satoru, 4,976,514, Cl. 350-345.000.

Tanaka, Shigeyoshi: *See*—
Minami, Akira; and Tanaka, Shigeyoshi, 4,977,551, Cl. 369-44.250.

Tanaka, Tadao: *See*—
Hara, Mitsuhiko; Takizawa, Shozo; Tanaka, Tadao; Taniguchi, Yasutaka; Wada, Shunichi; and Ohtagaki, Shigeki, 4,977,506, Cl. 364-424.050.

Tanaka, Takeshi: *See*—
Oki, Yoshinari; Tanaka, Takeshi; Tuno, Ryoji; and Yoshida, Yoshihiro, 4,976,130, Cl. 72-269.000.

Tanaka, Yoshio: *See*—
Negami, Shin'ichi; Nomachi, Hiroshi; Nemoto, Toru; Tanaka, Yoshio; and Ohta, Akira, 4,977,227, Cl. 527-400.000.

Tanaka, Yukitaka: *See*—
Yasukawa, Takuji; Yasumura, Daisuke; Yamasawa, Kimiko; Tanaka, Yukitaka; and Nishide, Tsutomu, 4,976,984, Cl. 426-602.000.

Tanami, Tohru: *See*—
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.

Tanase, Setsumi: *See*—
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; Tachibana, Hideki; and Tanase, Setsumi, 4,976,705, Cl. 604-304.000.

Tani, Tatsuo; and Watanabe, Mutsuo, to Ricoh Company, Ltd. Apparatus for supplying toner to an image forming apparatus. 4,977,429, Cl. 355-260.000.

Tani, Toshio; Kamiyama, Osamu; Matsuki, Noborn; Fukuda, Ryosaku; Akutsu, Tsukasa; and Nakatsugawa, Hiroshi, to Furukawa Circuit Foil Co., Ltd. Method of making electrodeposited copper foil. 4,976,826, Cl. 204-12.000.

Taniere, Jacques: *See*—
Simon, Jean-Michel; Taniere, Jacques; Ciolczyk, Jean-Pierre; and Domer, Michel, 4,976,412, Cl. 248-634.000.

Taniguchi, Katsutoshi: *See*—
Yanagihara, Masaaki; Taniguchi, Katsutoshi; and Fujita, Masakazu, 4,976,097, Cl. 57-208.000.

Taniguchi, Katuhico, to Suzuki Jidosha Kogyo Kabushiki Kaisha. Trochoid pump with radial clearances between the inner and outer rotors and between the outer rotor and the housing. 4,976,595, Cl. 418-171.000.

Taniguchi, Nobuyuki: *See*—
Tsuji, Kenji; Izumi, Shuji; Nakai, Masaaki; and Taniguchi, Nobuyuki, 4,977,423, Cl. 354-402.000.

Taniguchi, Shigeru: *See*—
Suginaka, Yutaka; and Taniguchi, Shigeru, 4,976,678, Cl. 494-68.000.

Taniguchi, Yasutaka: *See*—
Hara, Mitsuhiko; Takizawa, Shozo; Tanaka, Tadao; Taniguchi, Yasutaka; Wada, Shunichi; and Ohtagaki, Shigeki, 4,977,506, Cl. 364-424.050.

Tanokura, Nobukazu; and Fujikawa, Susumu, to Terumo Kabushiki Kaisha. Liquid separator. 4,976,851, Cl. 210-86.000.

Tapinassi, Roberto: *See*—
Saporiti, Roberto; Lipparini, Mauro; and Tapinassi, Roberto, 4,976,021, Cl. 29-91.100.

Tarbouriech, Jean-Claude, to Motorola, Inc. EPROM programming. 4,977,541, Cl. 365-189.110.

Tashiro, Koichi; Ikezawa, Mamoru; Sano, Takashi; Matsuura, Kosei; and Nakatani, Hajime, to Namco Ltd. Multi-player type video game playing system. 4,976,438, Cl. 273-313.000.

Tatchyn, Roman O.; Csonka, Paul L.; and Cremer, Jay T., to Leland Stanford Junior University, The Board of Trustees of the. Micropole undulator. 4,977,384, Cl. 335-210.000.

Tate & Lyle PLC: *See*—
Homer, Nigel J.; Jackson, Graham; Sankey, George H.; and Simpson, Philip J., 4,977,254, Cl. 536-124.000.

Tate, Orren R.: *See*—
Wuepper, Thomas E.; Grauherr, Keith R.; Tate, Orren R.; and Philo, Alfred D., 4,976,303, Cl. 164-29.000.

Tatung Company of America, Inc.: *See*—
Huang, Jyh C., 4,976,753, Cl. 55-124.000.

Taylor, Douglas B., to M & I Door Systems Limited. Apparatus for opening and closing roll-up door. 4,976,302, Cl. 160-310.000.

Taylor, John A., to Separation Dynamics, Inc. Composite semipermeable membranes and method of making same. 4,976,869, Cl. 210-644.000.

Taylor, John B., to General Electric Company. Unducted, counterrotating gearless front fan engine. 4,976,102, Cl. 60-226.100.

Taylor, Mark P., to Corning Incorporated. Method of making glass-ceramic laser gyroscope frame. 4,976,765, Cl. 65-33.000.

Taylor, Robert A. Door harps. 4,976,214, Cl. 116-100.000.

TDK Corporation: *See*—
Mizuno, Touru; and Kitajima, Yasuhiko, 4,976,356, Cl. 209-539.000.
Shiba, Haruo; and Ikebe, Masaru, 4,977,475, Cl. 360-133.000.

Teachout, James F.; and Teachout, Tammy S. Clothing ornamentation system and attachment mechanisms. 4,975,987, Cl. 2-246.000.

Teachout, Tammy S.: *See*—
Teachout, James F.; and Teachout, Tammy S., 4,975,987, Cl. 2-246.000.

Technip Geoproduction: *See*—
Delamare, Guy R., 4,976,074, Cl. 52-2.00J.

Teel, Willis A.; and Jones, Louis F., to United States of America, Navy. Target detector. 4,977,545, Cl. 367-124.000.

Teijin Limited: *See*—
Yanagihara, Masaaki; Taniguchi, Katsutoshi; and Fujita, Masakazu, 4,976,097, Cl. 57-208.000.

Teikoku Hume Pipe Co., Ltd.: *See*—
Yoshikawa, Nobuyoshi; and Asano, Hiroshi, 4,976,291, Cl. 138-175.000.

Tektronix, Inc.: *See*—
Odenthal, Conrad J., 4,977,348, Cl. 313-479.000.

Tel Sagani Limited: *See*—
Watanabe, Shingo, 4,976,613, Cl. 432-241.000.

Teledyne Industries, Inc.: *See*—
Wang, Chun T., 4,977,034, Cl. 428-548.000.

Teledyne Kinetics: *See*—
Werner, Oskar O., 4,976,629, Cl. 439-259.000.

Temple, Robert, to Societe Charentaise de Participations, S.A. Material for packaging a moisture-sensitive product, a process for the manufacture of such material, and packaging comprising such material. 4,977,031, Cl. 428-463.000.

Tepper, Harry W. Removable orthodontic appliance. 4,976,614, Cl. 433-18.000.

Terada, Yasuharu; Horita, Yoshiyuki; Ishii, Susumu; and Wake, Kiyoyasu, to Yoshida Kogyo K. K. Slider lock assembly. 4,976,120, Cl. 70-68.000.

Teramoto, Yoshikichi: *See*—
Mizuno, Toshiya; Teramoto, Yoshikichi; Saito, Takeshi; and Wakabayashi, Juichi, 4,976,908, Cl. 264-210.200.

Tero, John P., to North American Philips Corp. Rapid-response differential amplifier with rail-to-rail input capability. 4,977,378, Cl. 330-258.000.

Terrell, Joe: *See*—
Daniels, Lonnie E., 4,976,384, Cl. 224-42.230.

Terrell, Steven J.: *See*—
Daniels, Lonnie E., 4,976,384, Cl. 224-42.230.

Terrer, Maria T.: *See*—
Rodriguez, Domingo; Quintero, Lirio; Terrer, Maria T.; Jimenez, Euler; Silva, Felix; and Salazar, Jose, 4,976,745, Cl. 44-301.000.

Terumo Kabushiki Kaisha: *See*—
Oshiyama, Hiroaki, 4,976,708, Cl. 604-408.000.
Tanokura, Nobukazu; and Fujikawa, Susumu, 4,976,851, Cl. 210-86.000.

Teshima, Nobue: *See*—
Kato, Yasuyoshi; Teshima, Nobue; Ohta, Masao; and Konishi, Kunihiko, 4,977,128, Cl. 502-328.000.

Teske, Richard E.: *See*—
Eberhardt, H. Alfred; and Teske, Richard E., 4,976,319, Cl. 169-54.000.

Texaco Chemical Company: *See*—
Marquis, Edward T.; Keating, Kenneth P.; Meyer, Robert A.; and Sanderson, John R., 4,977,285, Cl. 549-529.000.

Texaco Inc.: *See*—
Durrett, Michael G.; Helms, David A.; Hatton, Gregory J.; Dowty, Earl L.; Marrelli, John D.; Stafford, Joseph D.; and Stavish, David J., 4,977,377, Cl. 324-640.000.
Najjar, Nitri S.; and Muan, Arnulf, 4,977,130, Cl. 502-351.000.
Prukop, Gabriel; and Chea, Chhiv K., 4,976,315, Cl. 166-270.000.
Supernaw, Irwin R., 4,977,319, Cl. 250-255.000.

Texas Instruments Incorporated: *See*—
Doddington, George R.; and Pawate, Basavaraj I., 4,977,598, Cl. 381-43.000.
Marshall, Andrew; Colman, Derek; Cavanagh, Philip J.; and Dale, David P., 4,977,476, Cl. 361-18.000.
Smith, Gregory C., 4,977,106, Cl. 437-192.000.
Stein, Dale P., 4,977,341, Cl. 307-572.000.

Theeuwes, Felix; and Wong, Patrick S. L., to ALZA Corporation. Delayed release osmotically driven fluid dispenser. 4,976,966, Cl. 424-473.000.

Therapeutic Technologies Inc.: *See*—
Petrofsky, Steven H., 4,976,264, Cl. 128-421.000.

Thermo King Corporation: *See*—
Manning, Thomas O., 4,976,114, Cl. 62-323.100.

Thoman, Thomas S.: *See*—
Salensky, George A.; and Thoman, Thomas S., 4,976,813, Cl. 156-230.000.

Thomas & Betts Corporation: *See*—
O'Loughlin, Francis A., 4,976,627, Cl. 439-100.000.

Thomas J. Lipton, Inc.: *See*—
Schubert, Gunther, 4,976,978, Cl. 426-295.000.

Thomas, Leonora: *See*—
Thomas, Orrett H.; and Thomas, Leonora, 4,976,172, Cl. 81-3.090.

Thomas, Orrett H.; and Thomas, Leonora. Bottle opener with key ring. 4,976,172, Cl. 81-3.090.

Thompson, Brian E.: *See*—
Gluck, Eric H.; Thompson, Brian E.; and Hall, Michael A., 4,976,261, Cl. 128-207.150.

Thompson, Duane T.: *See*—
Bowen, Mark S.; Fantone, Stephen D.; Miller, Bruce E.; and Thompson, Duane T., 4,977,325, Cl. 250-461.200.

Thompson, Lawrence B.: *See*—
Berthold, John W.; and Thompson, Lawrence B., 4,976,157, Cl. 73-861.240.

Thomson Hybrides et Microondes: *See*—
Delagebeaudeuf, Daniel; Derewonko, Henri; Godart, Jean J.; Resneau, Patrick; and Gibeau, Pierre, 4,977,434, Cl. 357-22.000.

Thorn EMI plc: *See*—
Carrington, Andrew N., 4,976,516, Cl. 350-343.000.

Thornburgh, Scott: *See*—
Gannon, James E.; and Thornburgh, Scott, 4,976,874, Cl. 210-755.000.

Thorner, Jeremy: *See*—
Sprague, George; Herskowitz, Ira; Thorner, Jeremy; Julius, David; Blair, Lindley; and Brake, Anthony, 4,977,085, Cl. 435-212.000.

Thornton, Peter B.; Cone, Stanley H.; and Booz, George W., to Stern & Stern Industries, Inc. Low permeability fabric. 4,977,016, Cl. 428-225.000.

Thornton, Theodore W.; and Leeflang, Willem E. Spring puller. 4,976,022, Cl. 29-227.000.

Thumm, Hermann, to Chateau Yaldara PTY. Ltd. Grape juice concentrate and drink. 4,976,974, Cl. 426-14.000.

Tibbitts, Gordon A., to Baker Hughes Incorporated. Drill bit having diamond film cutting surface. 4,976,324, Cl. 175-329.000.

Tiitto, Seppo I., to American Stress Technologies, Inc. Barkhausen noise method for determining biaxial stresses in ferromagnetic materials. 4,977,373, Cl. 324-209.000.

Toa Nenryo Kogyo K.K.: *See*—
Sakurada, Satoshi; Tagaya, Nobuaki; Miura, Tadashi; Maeshima, Tsugio; and Hashimoto, Takao, 4,977,120, Cl. 502-64.000.

Tobe, Akihiro: *See*—
Fujimori, Shinichiro; Yamazaki, Satoshi; Sugano, Mamoru; Kawamura, Makoto; Ninomiya, Kunihiro; Tobe, Akihiro; and Nitta, Issei, 4,977,151, Cl. 514-225.500.

Tochimura, Yoshimasa: *See*—
Matsutani, Kanji; Matsutani, Masamitsu; Otsuka, Tadashi; and Tochimura, Yoshimasa, 4,976,727, Cl. 606-223.000.

Toda, Fumio, to Daicel Chemical Industries, Ltd. Asymmetric photochemical reaction process. 4,976,834, Cl. 204-157.690.

Toda, Kazuya: *See*—
Suzuki, Junji; Ishida, Tatsuya; Toda, Kazuya; Ikeda, Tatsufumi; Tsukidate, Yokichi; and Yasuo, Kikuchi, 4,977,171, Cl. 514-365.000.

Toda, Masaaki; Ohuchida, Shuichi; and Ohno, Hiroyuki, to Ono Pharmaceutical Co., Ltd. Novel prolinal derivatives. 4,977,180, Cl. 514-423.000.

Toda, Yasuhiko: *See*—
Morita, Mitsuhiko; Toda, Yasuhiko; and Yamamoto, Tetuo, 4,977,024, Cl. 428-404.000.

Togai, Kazuhide: *See*—
Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, 4,976,241, Cl. 123-425.000.

Tognet, Jean-Paul: *See*—
Fabre, Frederic; Tognet, Jean-Paul; and Magnier, Claude, 4,976,939, Cl. 423-21.100.

Tokai Kogyo Kabushiki Kaisha: *See*—
Arima, Hidetoshi; and Hatayama, Satoyuki, 4,976,069, Cl. 49-497.000.

Tokyo Electric Company, Ltd.: *See*—
Shimosato, Masashi; Ochiai, Kuniaki; and Tsuyuki, Shinzi, 4,976,554, Cl. 400-124.000.

Tokyo Tanabe Company, Ltd.: *See*—
Yazaki, Takashi; and Takuma, Kazunori, 4,977,157, Cl. 514-258.000.

Toldalagi, Paul M.: *See*—
Rudnick, Paul J.; Toldalagi, Paul M.; and Neff, Harlan, 4,977,503, Cl. 364-410.000.

Tollini, Dennis R. Medical securing tape. 4,976,700, Cl. 604-180.000.

Tomaiuolo, Theodore. Vehicle locator. 4,976,410, Cl. 248-514.000.

Tomashauer, Josef; Zodrow, Rudolf; and Buchholz, Rainer, to ETI-TEC Maschinenbau GmbH. Apparatus for pressing foil on containers, such as on the tops and the necks of bottles or the like. 4,976,803, Cl. 156-297.000.

Tomcufcik, Andrew S.; Dixon, James S.; Epstein, Joseph W.; Birnberg, Gary H.; and Fanshawe, William J., to American Cyanamid Company. Substituted guanidinedicarbonyl derivatives. 4,977,189, Cl. 514-603.000.

Tomihashi, Nobuyuki: *See*—
Yoshimura, Tatsushiro; Tomihashi, Nobuyuki; and Simasaki, Shuhei, 4,977,221, Cl. 525-356.000.

Tomlinson, Alan: *See*—
Hahn, Paul; Reynolds, John; Tomlinson, Alan; O'Meara, Robert J.; and Drazba, Martin, 4,976,533, Cl. 351-160.00R.

Tomy Kogyo Co., Inc.: *See*—
Watanabe, Hiroyuki, 4,976,650, Cl. 446-418.000.

Tonen Corporation: *See*—
Suzuki, Sadakatsu; Inagaki, Hiroyuki; and Ueno, Hiroshi, 4,977,284, Cl. 549-508.000.

Tong, Timothy W.; Sathe, Sanjeev B.; and Peck, Robert E., to Arizona Board of Regents. Porous radiant burners having increased radiant output. 4,977,111, Cl. 501-95.000.

Toni Diagnostics, Inc.: *See*—
Gibbs, Walden L., Jr.; Curry, Jimmie L.; and Mostyn, William T., 4,977,517, Cl. 364-510.000.

Toperzer, Edward S., to Westinghouse Electric Corp. Spring mounted carbon brush wear indicator. 4,977,345, Cl. 310-242.000.

Topham, Arthur: *See*—
Hughes, Anthony H.; and Topham, Arthur, 4,976,837, Cl. 204-181.700.

Topline Leisure Ltd.: *See*—
Williams, Geoffrey A., 4,976,376, Cl. 221-24.000.

Torai, Yasushi: *See*—
Hayama, Masaharu; Takaoka, Kenji; Torai, Yasushi; and Fukada, Toshiharu, 4,976,116, Cl. 62-441.000.

Torigai, Katsumi; and Takahashi, Masanori, to Sanshin Kogyo Kabushiki Kaisha. Trim apparatus for marine propulsion unit. 4,976,636, Cl. 440-1.000.

Torii, Shumpeita: *See*—
Arakawa, Satoshi; Nonomura, Masamitu; Ogoda, Makoto; Torii, Shumpeita; and Kohda, Katsuhiro, 4,977,327, Cl. 250-484.100.

Torok, Vilmos; and Loreth, Andrezej, to Astra Vent AB. Arrangement for generating an electric corona discharge in air. 4,976,752, Cl. 55-117.000.

Torres, Robert J.: *See*—
McGaughey, Harry S., III; Melkus, Lovie A.; and Torres, Robert J., 4,977,520, Cl. 364-521.000.

Tosa, Takahumi: *See*—
Itagaki, Takaharu; Okada, Hiroyoshi; Miyake, Masao; Kobayashi, Takaaki; Tosa, Takahumi; and Satou, Hiroyuki, 4,976,976, Cl. 426-69.000.

Toth, Robert B., to Northern Telecom Limited. Fan operating status sensing circuit. 4,977,375, Cl. 324-511.000.

Tough, William H., to Scott & Fyfe Limited. Method for producing backing material for carpet underlay. 4,976,118, Cl. 66-85.00A.

Toume, Naotosi: *See*—
Asakura, Masahiko; Shiraiwa, Kimio; Hattori, Yoichi; and Toume, Naotosi, 4,977,349, Cl. 313-490.000.

Toyama, Niichi: *See*—
Murayama, Junichi; Iiyama, Kazuto; Toyama, Niichi; Sadamitsu, Katsushi; and Takashima, Hideki, 4,977,000, Cl. 427-424.000.

Toyo Jozo Company, Ltd.: *See*—
Yamada, Hitoshi; Endo, Ken; and Kotani, Kikuo, 4,977,139, Cl. 514-11.000.

Toyo Roki Seizo Kabushiki Kaisha: *See*—
Kadoya, Teruichi, 4,976,858, Cl. 210-496.000.

Toyoda, Katsuhiko, to Suzuki Jidosha Kogyo Kabushiki Kisha. Apparatus for controlling the number of idle rotations of an internal combustion engine. 4,976,238, Cl. 123-339.000.

Toyomi, Toshitaka: *See*—
Ishikawa, Satoru; and Toyomi, Toshitaka, 4,976,552, Cl. 388-811.000.

Toyota Jidosha Kabushiki Kaisha: *See*—
Ise, Kiyotaka, 4,976,329, Cl. 180-197.000.
Ito, Hiroshi; Handa, Junichi; Takagi, Yoshio; and Minohara, Taketoshi, 4,976,787, Cl. 106-441.000.
Sonoda, Yukihiro; Osawa, Kouichi; Kanai, Hiroshi; Hoshi, Kouichi; Matsuoka, Hiroki; Ohashi, Michihiro; and Sawada, Hiroshi, 4,976,242, Cl. 123-489.000.
Takahashi, Takeshi; and Itatsu, Toshiro, 4,976,245, Cl. 123-506.000.

TPV Energy Systems, Inc.: *See*—
Nelson, Robert E., 4,976,606, Cl. 431-79.000.

Trauth, Hubert: *See*—
Aumueller, Alexander; Neumann, Peter; and Trauth, Hubert, 4,976,889, Cl. 252-403.000.

Travenol Laboratories (Israel) Ltd.: *See*—
Atad, Jack, 4,976,692, Cl. 604-101.000.

Travers, Christine: *See*—
Dufresne, Pierre; Franck, Jean-Pierre; Raatz, Francis; and Travers, Christine, 4,977,121, Cl. 502-66.000.

Travers, Mark D.: *See*—
Moore, Lyman T.; and Travers, Mark D., 4,977,576, Cl. 373-93.000.

Travis, Jonathan A.; and Woodard, Winfred L., III, to Ergenics, Inc. Getter strip. 4,977,035, Cl. 428-550.000.

Treadway, Woodrow L. Arrow with removable transmitter and method of use. 4,976,442, Cl. 273-416.000.

Trehan, Ashok K.: *See*—
Sanchez, Joseph P.; and Trehan, Ashok K., 4,977,154, Cl. 514-254.000.

Trett, John, to Formula Systems Limited. Proximity detection systems. 4,976,337, Cl. 187-51.000.

Tri Tool Inc.: *See*—
Vanderpol, Jerald; and Astle, William H., 4,976,176, Cl. 82-113.000.

Trimble, Roger B.: *See*—
Baker, Joseph R.; Golland, Wesley A.; Mullens, Paul A.; and Trimble, Roger B., 4,977,502, Cl. 364-405.000.

Trinh, Toan: *See*—
Maldonado, Rene; Trinh, Toan; and Gosselink, Eugene P., 4,976,879, Cl. 252-8.700.

Tropicana Products, Inc.: *See*—
Bettle, Griscom, III; and Gargano, Christopher W., 4,977,004, Cl. 428-36.700.

Trott, Arthur F.: *See*—
Bays, F. Barry; Trott, Arthur F.; and Marchand, Sam R., 4,976,715, Cl. 606-77.000.

Troy Chemical Corporation: *See*—
Gruening, Rainer, 4,977,186, Cl. 514-479.000.

Troyk, Philip R.: *See*—
Anderson, James E.; Markovac, Vlado; and Troyk, Philip R., 4,977,009, Cl. 429-76.000.

Trubakov, Venediktovich: *See*—
Kovalev, Evgeny P.; Sushkin, Alexandr M.; Trubakov, Venediktovich; Shpektorov, Vladimir N.; and Shpektorov, Iosif N., 4,976,051, Cl. 37-94.000.

TRW Inc.: *See*—
Venable, Frederick D.; and Hudgens, Bernard C., 4,976,167, Cl. 74-533.000.

Tschanz, Pierre. Watch adaptable to being worn on the wrist and around the neck. 4,976,548, Cl. 368-277.000.

Tsinberg, Mikhail, to U.S. Philips Corporation. HDNTSC channel with frequency multiplexing. 4,977,454, Cl. 358-141.000.

Tsuchida, Tetsuo; Meguro, Tatsuya; Seyama, Fumio; and Kondo, Mitsuru, to Kanzaki Paper Manufacturing Co., Ltd. Heat-sensitive record material. 4,977,132, Cl. 503-220.000.

Tsuchiya, Eiichi: *See*—
Arai, Mitsuhiro; Tsuchiya, Eiichi; and Ikeda, Tetsuo, 4,977,473, Cl. 360-130.240.

Tsuchiya, Kazuhisa; Enosawa, Yoshio; and Kitajima, Motohiro, to Motorola, Inc. High density DRAM. 4,977,436, Cl. 357-236.000.

Tsuda, Yoshiaki: *See*—
Nakamura, Shizuo; Inai, Masatoshi; Inoue, Makoto; Nagao, Kazushi; and Tsuda, Yoshiaki, 4,977,179, Cl. 514-423.000.

Tsui, James B. Y.; and McCormick, William S., to United States of America, Air Force. Instantaneous frequency measurement (IFM) receiver to measure frequency and angle of arrival (AOA) of multiple signals. 4,977,365, Cl. 324-78.00R.

Tsuji, Kenji; Izumi, Shuji; Nakai, Masaaki; and Taniguchi, Nobuyuki, to Minolta Camera Kabushiki Kaisha. Exposure calculating apparatus. 4,977,423, Cl. 354-402.000.

Tsuji, Tomoji: *See*—
Okawa, Takashi; Isogai, Nobuo; and Tsuji, Tomoji, 4,976,679, Cl. 560-159.000.

Tsujii, Kaoru: *See*—
Takahashi, Hiromichi; and Tsujii, Kaoru, 4,976,860, Cl. 210-500.280.

Tsujimoto, Yasuhiro; Kurita, Masayuki; and Aoki, Masaru, to Takeda Chemical Industries, Ltd. Winding apparatus for sheet-shaped molding material. 4,976,473, Cl. 242-67.10R.

Tsujisawa, Takahiko: *See*—
Murayama, Hiroki; Tsujisawa, Takahiko; and Hashimoto, Toshikazu, 4,977,470, Cl. 360-77.040.
Tsukamoto, Katsuya; and Abiko, Toshio, to Matsushita Electric Works, Ltd. Planar antenna. 4,977,406, Cl. 343-700.0MS.
Tsukamoto, Tokihiro: *See*—
Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, 4,976,241, Cl. 123-425.000.
Tsukidate, Yokichi: *See*—
Suzuki, Junji; Ishida, Tatsuya; Toda, Kazuya; Ikeda, Tatsufumi; Tsukidate, Yokichi; and Yasuo, Kikuchi, 4,977,171, Cl. 514-365.000.
Tsukude, Masaki: *See*—
Matsuda, Yoshio; Fujishima, Kazuyasu; Ooishi, Tsukasa; Arimoto, Kazutami; and Tsukude, Masaki, 4,977,542, Cl. 365-207.000.
Tsuneki, Hideaki; Ariyoshi, Kimio; Moriya, Atusi; and Ueshima, Michio, to Nippon Shokubai Kagaku Kogyo Co., Ltd. Method for regeneration of catalyst for producing of aziridine compounds. 4,977,118, Cl. 502-35.000.
Tsunoda, Takeo; Takeo, Setsu; Nobusawa, Tatsuya; Enomoto, Norihide; Takahashi, Hiroyasu; Watanabe, Minoru; Sasaki, Yutaka; and Tanaka, Kunihiro, to Kawasaki Steel Corporation. Process for oxidizing carbon monoxide in exhaust gas from a sintering furnage. 4,976,941, Cl. 423-247.000.
Tsuruoka, Michihiko: *See*—
Nagumo, Mutsumi; Nakagawa, Wataru; and Tsuruoka, Michihiko, 4,976,153, Cl. 73-861.030.
Tsuruta, Kozo; and Yamada, Yuichi, to Aisin Takaoka Co., Ltd. Die exchanger of molding apparatus. 4,976,601, Cl. 425-182.000.
Tsutsui, Koichi: *See*—
Nakano, Shinji; Tsutsui, Koichi; Ikeda, Shoji; and Hirasawa, Yoji, 4,976,785, Cl. 106-287.170.
Tsutsumi, Shigeru, to Sanri Kabushiki Kaisha. Method and apparatus for gushing air stream into metal molds in injection molding machine. 4,976,900, Cl. 264-39.000.
Tsuyuki, Shinzi: *See*—
Shimosato, Masashi; Ochiai, Kuniaki; and Tsuyuki, Shinzi, 4,976,554, Cl. 400-124.000.
Tucker Housewares, Inc.: *See*—
Cassel, Timothy S., 4,976,370, Cl. 220-306.000.
Tucker, Joe W. Foundation stanchion for mobile home foundations apparatus and method. 4,976,077, Cl. 52-126.600.
Tullin, Flemming: *See*—
Ejlersen, Henning M.; and Tullin, Flemming, 4,976,701, Cl. 604-192.000.
Tuno, Ryoji: *See*—
Oki, Yoshinari; Tanaka, Takeshi; Tuno, Ryoji; and Yoshida, Yoshihiro, 4,976,130, Cl. 72-269.000.
Turner, James A.; Jacks, Wendy S.; and Zorner, Paul S., to Dow Chemical Company, The. 4-((aryloxy)phenoxy)alkenol as intermediates and herbicides. 4,976,772, Cl. 71-92.000.
Twombly, Benjamin: *See*—
McKinley, Kerry; and Twombly, Benjamin, 4,976,152, Cl. 73-852.000.
Tynkkynen, Soile S. H.: *See*—
von Wright, Atte J.; Sivela, Seppo K.; and Tynkkynen, Soile S. H., 4,977,088, Cl. 435-252.300.
UAB Research Foundation: *See*—
Urry, Dan W.; and Long, Marianna, 4,976,734, Cl. 623-11.000.
Ube Industries, Ltd.: *See*—
Morita, Mitsuhiko; Toda, Yasuhiko; and Yamamoto, Tetuo, 4,977,024, Cl. 428-404.000.
Ube-Nitto Kasei Co., Ltd.: *See*—
Nakasone, Takayoshi; Kozuka, Kenji; and Kimura, Haruo, 4,976,906, Cl. 264-139.000.
Uchida, Katsuyuki, to Murata Manufacturing Co., Ltd. Organic PTC thermistor. 4,977,309, Cl. 219-541.000.
Uchikata, Yoshio, to Canon Kabushiki Kaisha. Sheet conveying device with axially disengaged transmitter of restraining force. 4,976,557, Cl. 400-565.000.
Udagawa, Tsunekazu, to Ishikawa Gasket Co., Ltd. Steel laminate gasket. 4,976,445, Cl. 277-231.000.
Udd, Eric, to McDonnell Douglas Corporation. Sagnac distributed sensor. 4,976,507, Cl. 350-96.180.
Ueda, Hirotsugu: *See*—
Okuhara, Masakuni; Goto, Toshio; Hori, Yasuhiro; Fujita, Takashi; Ueda, Hirotsugu; and Shigematsu, Nobuharu, 4,977,138, Cl. 514-10.000.
Uenaka, Kazushige: *See*—
Takase, Haruo; Uenaka, Kazushige; Abf, Akira; and Fujita, Yoshihiro, 4,976,870, Cl. 210-668.000.
Ueno, Hiroshi: *See*—
Suzuki, Sadakatsu; Inagaki, Hiroyuki; and Ueno, Hiroshi, 4,977,284, Cl. 549-508.000.
Ueshima, Michio: *See*—
Tsuneki, Hideaki; Ariyoshi, Kimio; Moriya, Atusi; and Ueshima, Michio, 4,977,118, Cl. 502-35.000.
Ueyama, Shuziro, to NEC Corporation. Serial printer control circuit enabling line feed during carriage deceleration. 4,976,555, Cl. 400-314.100.
Ujj, Ronald: *See*—
Kordesch, Karl; and Ujj, Ronald, 4,977,364, Cl. 320-21.000.
Umaba, Toshikatsu: *See*—
Rikimaru, Hiroaki; Nakatsuji, Tadao; Umaba, Toshikatsu; Nagano, Kazuhiko; Mishina, Kazuya; and Shimizu, Hiromitsu, 4,977,127, Cl. 502-309.000.
Umemori, Noboru; Kouda, Osamu; and Horii, Yukio, to Mitsubishi Plastics Industries Limited. Corrugated pipe. 4,976,289, Cl. 138-122.000.
Umesaki, Norimasa: *See*—
Iwamoto, Nobuya; Umesaki, Norimasa; Hidaka, Hiroaki; and Haibara, Yukio, 4,976,806, Cl. 156-325.000.
Umesato, Shoji: *See*—
Ishizuka, Shinichi; Suzuki, Takao; Umesato, Shoji; and Okada, Yoshikatsu, 4,976,624, Cl. 439-70.000.
Ungarelli, Raffaele: *See*—
Gementi, Francesco; Sogli, Loris; and Ungarelli, Raffaele, 4,977,291, Cl. 556-466.000.
Union Carbide Chemicals and Plastics Company Inc.: *See*—
Burgess, Lloyd M.; and Gibson, Charles A., 4,977,266, Cl. 544-398.000.
Koleske, Joseph V.; and Kwiatkowski, George T., 4,977,199, Cl. 522-31.000.
Watson, Stuart L., Jr., 4,977,219, Cl. 525-329.500.
Union Carbide Corporation: *See*—
Chippett, Simon; and Conviser, Stephen A., 4,976,922, Cl. 422-34.000.
Unisys Corporation: *See*—
Cerminara, Dominic, 4,977,581, Cl. 375-107.000.
Chabries, Douglas M.; and Christiansen, Richard W., 4,977,604, Cl. 382-42.000.
Stratton, William; and Wellington, Carol, 4,977,495, Cl. 364-200.000.
United Engineering, Inc.: *See*—
Ginzburg, Vladimir B.; and Ellis, Robert H., 4,976,158, Cl. 73-862.070.
United States of America
Agriculture: *See*—
Sawhney, A. Paul S.; Folk, Craig L.; and Robert, Kearny Q., 4,976,096, Cl. 57-12.000.
Air Force: *See*—
Arnold, Fred E.; Helminiak, Thaddeus E.; Wiff, Donald R.; Tan, Loon S.; Hwang, Wen F.; and Chuah, Hoe, 4,977,223, Cl. 525-432.000.
Tsui, James B. Y.; and McCormick, William S., 4,977,365, Cl. 324-78.00R.
Army: *See*—
Holloman, Miles E.; Jordan, Debbee J.; and Otto, William F., 4,976,789, Cl. 136-246.000.
Energy: *See*—
Benson, David A.; Bickes, Robert W., Jr.; and Blewer, Robert S., 4,976,200, Cl. 102-202.700.
Bieg, Lothar F., 4,976,043, Cl. 33-551.000.
Bowman, Charles D., 4,976,911, Cl. 376-221.000.
Huffman, Dennis D.; Hughes, Robert C.; Kelsey, Charles A.; Lane, Richard; Ricco, Antonio J.; Snelling, Jay B.; and Zipperian, Thomas E., 4,976,266, Cl. 128-659.000.
Khan, M. Rashid, 4,976,549, Cl. 374-56.000.
Knize, Randall J.; and Cecchi, Joseph L., 4,976,938, Cl. 423-249.000.
Maestas, Joseph H.; and Pierson, Lyndon G., 4,977,596, Cl. 380-48.000.
Migliori, Albert; Visscher, William M.; and Fisk, Zachary, 4,976,148, Cl. 73-579.000.
Musket, Ronald G.; Brown, David W.; and Munir, Zuhair A., 4,976,987, Cl. 427-38.000.
Nilsen, Joseph, 4,977,572, Cl. 372-69.000.
Paulson, Leland E., 4,976,940, Cl. 423-648.100.
Wantuck, Paul J., 4,977,560, Cl. 372-2.000.
Zaromb, Solomon, 4,977,095, Cl. 436-178.000.
Health and Human Services: *See*—
Muchmore, Andrew V.; and Decker, Jean M., 4,977,244, Cl. 530-350.000.
National Aeronautics and Space Administration: *See*—
Bozeman, Richard J., Jr., 4,977,395, Cl. 340-683.000.
Navy: *See*—
Bateman, Ray E., 4,977,579, Cl. 375-10.000.
Burns, William K., 4,976,518, Cl. 350-96.160.
Flatley, James P.; and Shajenko, Peter, 4,977,546, Cl. 367-140.000.
Jehle, Robert E., 4,977,323, Cl. 250-332.000.
Teel, Willis A.; and Jones, Louis F., 4,977,545, Cl. 367-124.000.
Yamanouchi, Glenn T.; and Orillo, Stephen, Jr., 4,976,036, Cl. 33-23.030.
U.S. Philips Corporation: *See*—
Bergervoet, Jozef R. M.; and Konings, Leonardus U. E., 4,977,354, Cl. 315-248.000.
Bonnet, Thierry; and Mathieu, Yves, 4,977,518, Cl. 364-521.000.
Dams, Franciscus J. L., 4,977,555, Cl. 370-29.000.
Fonsalas, Frederic; Hayet, Pascal; Lejard, Jean-Yves; and Le Queau, Marcel, 4,977,453, Cl. 358-138.000.
Frijlink, Peter, 4,976,217, Cl. 118-733.000.
Hartmann, Wilbert J. A. M., 4,976,515, Cl. 350-333.000.
Horl, Manfred L. A., 4,977,597, Cl. 381-11.000.
Kruit, Pieter; and Van Der Mast, Karel D., 4,977,324, Cl. 250-396.0ML.
Martiny, Ingo A., 4,977,336, Cl. 307-290.000.
Tsinberg, Mikhail, 4,977,454, Cl. 358-141.000.

Van der Ende, Adrianus, 4,977,588, Cl. 378-196.000.
Van Vucht, Robertus J. M., 4,977,328, Cl. 250-491.100.
Univ. of California, The Board of Regents of the: *See*—
Sprague, George; Herskowitz, Ira; Thorner, Jeremy; Julius, David; Blair, Lindley; and Brake, Anthony, 4,977,085, Cl. 435-212.000.
University of California, The Regents of the: *See*—
Goodwin, James M.; Rosen, Bruce E.; Vidal, Jacques J.; Mackenzie, John D.; and Wu, Edward T. H., 4,977,340, Cl. 365-49.000.
Lynn, Scott, 4,976,935, Cl. 423-222.000.
University of Chicago, The: *See*—
Pelizzari, Charles A.; and Chen, George T. Y., 4,977,505, Cl. 364-413.190.
University of Colorado Foundation, Inc.: *See*—
Pankove, Jacques I., 4,977,433, Cl. 357-16.000.
University of Florida: *See*—
Kurzweg, Ulrich H., 4,976,311, Cl. 165-84.000.
University of Florida Research Foundation, Inc.: *See*—
Boyle, Michael D. P.; and Reis, Kathleen J., 4,977,082, Cl. 435-71.100.
University of Illinois Board of Trustees: *See*—
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University of Melbourne, The: *See*—
Jeffcott, Leo B.; and McCartney, Ronald N., 4,976,267, Cl. 128-660.010.
University of Michigan, The: *See*—
Meyer, James H.; Amidon, Gordon L.; and Dressman, Jennifer B., 4,976,949, Cl. 424-1.100.
University of Pennsylvania, Trustees of the: *See*—
Nicolaou, Kyriacos C.; and Caulfield, Thomas J., 4,977,286, Cl. 552-4.000.
University of Southern Mississippi, The: *See*—
Culberson, Doris A.; and Mathias, Lon J., 4,977,229, Cl. 528-26.000.
University of Sydney: *See*—
Green, Wesley F., 4,977,142, Cl. 514-23.000.
University of Texas System, The Board of Regents of the: *See*—
Smith, R. Graham, 4,977,086, Cl. 435-240.270.
University of Utah Research Foundation: *See*—
Holfert, John W.; and Olsen, Donald B., 4,976,729, Cl. 623-3.000.
UOP: *See*—
Barder, Timothy J.; Bedweil, W. Brian; and Johnson, Steven P., 4,977,243, Cl. 530-208.000.
Koves, William J., 4,977,119, Cl. 502-48.000.
Long, Gary N.; Pellet, Regis J.; and Rabo, Jule A., 4,976,846, Cl. 208-114.000.
Uphues, Guenter; Ploog, Uwe; Becker, Wolfgang; and Goebel, Irmhild, to Henkel Kommanditgesellschaft auf Aktien. Quaternary ammonium phosphates based on amino-functional polyesters. 4,977,294, Cl. 558-208.000.
Upjohn Company, The: *See*—
Livingston, Douglas A.; Pearlman, Bruce A.; and Denmark, Scott, 4,977,255, Cl. 540-4.000.
Urazgildin, Ilyas A.: *See*—
Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A., 4,976,322, Cl. 175-57.000.
Urbach, Hansjorg: *See*—
Henning, Rainer; and Urbach, Hansjorg, 4,977,260, Cl. 544-73.000.
Urry, Dan W.; and Long, Marianna, to UAB Research Foundation. Stimulation of chemotaxis by chemotactic peptides. 4,976,734, Cl. 623-11.000.
Usagawa, Yasushi; and Ishii, Fumio, to Konica Corporation. Silver halide photographic light-sensitive material capable of obtaining high contrast images. 4,977,063, Cl. 430-264.000.
Usuda, Kinya: *See*—
Masuda, Satoshi; Shigemitsu, Fumiaki; and Usuda, Kinya, 4,976,810, Cl. 156-659.100.
Usui Kokusai Sangyo Kabushiki Kaisha: *See*—
Takikawa, Kazunori; and Serizawa, Haruo, 4,976,103, Cl. 60-299.000.
Utagawa, Ken: *See*—
Kusaka, Yosuke; and Utagawa, Ken, 4,977,311, Cl. 250-201.800.
Uteshev, Rashid A.: *See*—
Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A., 4,976,322, Cl. 175-57.000.
Utevskii, Lev: *See*—
Herzlinger, Andrei; Shorr, Leonard M.; Antebi, Salomone; Morel-Fisher, Theodor; Utevskii, Lev; and Scheinert, Yaakov, 4,977,262, Cl. 544-221.000.
Utica Enterprises, Inc.: *See*—
Dacey, Ernest A., Jr., 4,976,026, Cl. 29-714.000.
Utsumi, Shigeo, to Diafoil Company, Ltd. Transfer material for use with printer. 4,977,020, Cl. 428-323.000.
Utsumi, Shigeo: *See*—
Nozawa, Seiichi; Utsumi, Shigeo; and Nakata, Michio, 4,977,230, Cl. 528-125.000.
Uwe, Gartner F.: *See*—
Schiek, Burkhard; and Uwe, Gartner F., 4,977,376, Cl. 324-613.000.
Uzawa, Tsutomu: *See*—
Ishii, Atsujiro; and Uzawa, Tsutomu, 4,976,521, Cl. 350-423.000.
Valdelievre, Benoit: *See*—
Paliard, Maurice; Martin, Jean-Marc; Cochet, Francis; and Valdelievre, Benoit, 4,976,469, Cl. 241-24.000.
Valdiserri, Mario: *See*—
Baradel, Agostino; Della Penna, Gino; Gulinelli, Silvio; Valdiserri, Mario; and Robertiello, Andrea, 4,976,864, Cl. 210-610.000.
Valeo: *See*—
Bacher, Michel; and Bionaz, Jean E., 4,976,656, Cl. 464-68.000.
Valio Meijerien Keskusosuusliike: *See*—
von Wright, Atte J.; Sivela, Seppo K.; and Tynkkynen, Soile S. H., 4,977,088, Cl. 435-252.300.
Valiton, Anne S.: *See*—
Rastegar, Joseph; and Valiton, Anne S., 4,977,498, Cl. 364-200.000.
Valiulis, Stanley C., to Southern Imperial, Inc. Arm-type label holder for display hangers. 4,976,058, Cl. 40-657.000.
Vallee, Eric: *See*—
Bernat, Andre ; Delabassee, Denis; Frehel, Daniel; Maffrand, Jean-Pierre; and Vallee, Eric, 4,977,168, Cl. 514-330.000.
Valmet Oy: *See*—
Laapotti, Jorma, 4,976,821, Cl. 162-360.100.
Valmet Paper Machinery Inc.: *See*—
Laapotti, Jorma, 4,976,820, Cl. 162-206.000.
Van Doorne's Transmissie B.V.: *See*—
Hendrikus, Johannes, 4,976,663, Cl. 474-242.000.
Vanaschen, Luc: *See*—
Kuster, Hans-Werner; and Vanaschen, Luc, 4,976,766, Cl. 65-289.000.
Vanderbilt University: *See*—
Parl, Fritz F.; Bradley, Charles A.; Benge, Herman; and Black, David L., 4,976,270, Cl. 128-760.000.
Van der Ende, Adrianus, to U.S. Philips Corporation. X-ray examination apparatus. 4,977,588, Cl. 378-196.000.
van der Griendt, Andrianus J.: *See*—
Bedi, Ram D.; and van der Griendt, Andrianus J., 4,976,233, Cl. 123-196.00R.
Van Der Mast, Karel D.: *See*—
Kruit, Pieter; and Van Der Mast, Karel D., 4,977,324, Cl. 250-396.0ML.
Vanderpol, Jerald; and Astle, William H., to Tri Tool Inc. Weld crown removal module. 4,976,176, Cl. 82-113.000.
Van Der Scheer, Albert; and Werner, Jan, to Shell Oil Company. Process for preparing non-porous, selective membrane layers. 4,976,856, Cl. 210-490.000.
VanderSlik, Julius. Retaining sleeve for surgical pin. 4,976,712, Cl. 606-59.000.
van Dijken, Marten C.: *See*—
Prinsloo, Willem J. C.; de Villiers, Pierre; and van Dijken, Marten C., 4,976,748, Cl. 55-1.000.
VanJaarsveld, Robert P.: *See*—
Martell, William A.; Weiss, Ladislaus; VanJaarsveld, Robert P.; and Brown, Colin R., 4,976,400, Cl. 249-134.000.
Van Meter, Brad, to McLaughlin Manufacturing Company, Inc. Horizontal earth boring machine and method. 4,976,321, Cl. 175-24.000.
Van Noy, John R.: *See*—
Harrison, John R.; and Van Noy, John R., 4,976,672, Cl. 493-130.000.
Van Vucht, Robertus J. M., to U.S. Philips Corporation. Method of detecting a marker provided on a specimen. 4,977,328, Cl. 250-491.100.
Vauchel, Guy B., to Societe anonyme dite Hispano-Suiza. Thrust reverser for a turbojet engine. 4,976,466, Cl. 239-265.290.
Vaughan, Quentin D., IV, to Visicon, Inc. Apparatus for transporting flat sheets, especially photosensitive sheet materials. 4,977,422, Cl. 354-317.000.
Veal, Loraine E.: *See*—
Kovacevic, Steven; Miller, James R.; Veal, Loraine E.; and Wood, John S., 4,977,089, Cl. 435-252.310.
Vecsei, Vilmos: *See*—
Richter, Karl M.; and Vecsei, Vilmos, 4,976,258, Cl. 606-64.000.
Veeder-Root Limited: *See*—
Norris, Stephen G., 4,977,528, Cl. 364-571.040.
Venable, Frederick D.; and Hudgens, Bernard C., to TRW Inc. Tilt-telescope steering column. 4,976,167, Cl. 74-533.000.
Verbiar, Clifford P.; and Cote, Richard. Furring and method of appling same. 4,976,084, Cl. 52-713.000.
Verbov, Lev F.: *See*—
Dunaway, Weyman H.; and Verbov, Lev F., 4,976,786, Cl. 106-416.000.
Verdini, Antonio S.: *See*—
Nuzzolo, Carlo A.; Bernardi, Adriano; Pessi, Antonello; and Verdini, Antonio S., 4,977,079, Cl. 435-7.000.
Åverin, Gennady V., to Zaporozhsky Avtomobilny ZaVod "Kommunar" (Proizvodstvennoe Objedinenie "AV to ZAZ" . Air conditioner for a vehicle. 4,976,309, Cl. 165-42.000.
Verpac, S.p.A.: *See*—
Bosi, Gianni, 4,976,675, Cl. 493-295.000.
Verstraeten, Walter: *See*—
Descamps, Marcel; and Verstraeten, Walter, 4,977,274, Cl. 548-455.000.
Vesuvius Crucible Company: *See*—
Greenspan, David C., 4,977,001, Cl. 428-34.600.
Vetco Gray Inc.: *See*—
Hosie, Stanley; and Araujo, Luis A. G., 4,976,458, Cl. 285-24.000.
Vicik, Stephen J.: *See*—
Lustig, Stanley; Mack, Nancy M.; Schuetz, Jeffrey M.; and Vicik, Stephen J., 4,976,898, Cl. 264-22.000.

Victor Company of Japan, Ltd.: *See*—
Arai, Mitsuhiro; Tsuchiya, Eiichi; and Ikeda, Tetsuo, 4,977,473, Cl. 360-130.240.
Ishigaki, Yukinobu; and Mizuno, Kenichi, 4,977,578, Cl. 375-1.000.
Takanashi, Itsuo; Ichitou, Toshikatsu; Kitamura, Hiroki; Yamamura, Takashi; Sakagami, Koubun; and Nakano, Atsushi, 4,977,417, Cl. 346-160.000.
Vidal, Jacques J.: *See*—
Goodwin, James M.; Rosen, Bruce E.; Vidal, Jacques J.; Mackenzie, John D.; and Wu, Edward T. H., 4,977,540, Cl. 365-49.000.
Virginia Tech Intellectual Properties Inc.: *See*—
Gibson, Harry W.; and Jois, Yajnanarayana H. R., 4,977,271, Cl. 548-328.000.
Virtanen, Kalervo. Oil collecting vessel. 4,976,855, Cl. 210-242.300.
Visicon, Inc.: *See*—
Vaughan, Quentin D., IV, 4,977,422, Cl. 354-317.000.
Viskase Corporation: *See*—
Lustig, Stanley; Mack, Nancy M.; Schuetz, Jeffrey M.; and Vicik, Stephen J., 4,976,898, Cl. 264-22.000.
Visscher, William M.: *See*—
Migliori, Albert; Visscher, William M.; and Fisk, Zachary, 4,976,148, Cl. 73-579.000.
Vittimberga, Bruno M., to Board of Governors for Higher Education, State of Rhode Island and Providence Plantations, The. 1-(4'-pyridyl)-4-pyridone, its derivatives and herbicidal use thereof. 4,976,774. Cl. 71-94.000.
Vogeley, Arthur W.: *See*—
Vogeley, James H.; and Vogeley, Arthur W., 4,976,536, Cl. 353-77.000.
Vogeley, James H.; and Vogeley, Arthur W., to nView Corporation. Liquid crystal display for projection systems. 4,976,536, Cl. 353-77.000.
Voigt, Dieter, to Volkswagen AG. Valve mechanism, preferably for an internal combustion engine, having pressure medium supply passage. 4,976,230, Cl. 123-90.490.
Volkswagen AG: *See*—
Voigt, Dieter, 4,976,230, Cl. 123-90.490.
Vollbrecht, Heinz-Rudiger: *See*—
Klima, Hubertus; Schutz, Erwin; and Vollbrecht, Heinz-Rudiger, 4,976,979, Cl. 426-427.000.
Volz, Le Roy A.; and Pease, Mark E., to Seagate Technology, Inc. Servo address system. 4,977,472, Cl. 360-78.140.
von Kozierowski, Joachim. Heavier-than-air disk-type aircraft. 4,976,395, Cl. 244-12.200.
von Schuckmann, Alfred, to Franz Pohl Metall- und Kunststoffwarenfabrik GmbH. Device for emptying tubes. 4,976,380, Cl. 222-103.000.
von Wright, Atte J.; Sivela, Seppo K.; and Tynkkynen, Soile S. H., to Valio Meijerien Keskusosuusliike. Vector plasmid suited for souring agents, dairy souring agents in particular. 4,977,088, Cl. 435-252.300.
Vorosmarthy, to International Financial Associates Holdings, Inc. Optical lens for the human eye. 4,976,732, Cl. 623-6.000.
W. R. Grace & Co.-Conn.: *See*—
Cornelison, Richard C.; and Whittenberger, William A., 4,976,929, Cl. 422-174.000.
Ernest, Michael V., 4,977,129, Cl. 502-330.000.
Hwa, Chih M.; Kelly, John A.; and Adhya, Mita, 4,977,292, Cl. 558-81.000.
Mueller, Walter B., 4,977,022, Cl. 428-349.000.
W. Schlafhorst & Co.: *See*—
Brockmanns, Karl-Josef; and Lembeck, Theo, 4,976,099, Cl. 57-411.000.
Wacker Silicones Corporation: *See*—
Salemka, Mark E.; and Lorenzen, James W., 4,976,091, Cl. 53-467.000.
Wada, Shunichi: *See*—
Hara, Mitsuhiko; Takizawa, Shozo; Tanaka, Tadao; Taniguchi, Yasutaka; Wada, Shunichi; and Ohtagaki, Shigeki, 4,977,506, Cl. 364-424.050.
Wadsworth, Alan: *See*—
Collington, Eric W.; Hallett, Peter; Wallis, Christopher J.; Wadsworth, Alan; and Hayes, Norman F., 4,977,163, Cl. 514-317.000.
Wagner, Gunter: *See*—
Pohlenz, Hans; and Wagner, Gunter, 4,976,433, Cl. 273-73.00E.
Wakabayashi, Hiroshi; Iwakiri, Hisami; Tamai, Kazuhiko; and Isayama, Katsuhiko, to Kanegafuchi Chemical Industry Co., Ltd. Curable polymer composition. 4,977,228, Cl. 528-12.000.
Wakabayashi, Juichi: *See*—
Mizuno, Toshiya; Teramoto, Yoshikichi; Saito, Takeshi; and Wakabayashi, Juichi, 4,976,908, Cl. 264-210.200.
Wakashima, Yoshiaki: *See*—
Ohtani, Hideya; Momoi, Toshimitsu; Ooi, Eiji; Sakuraba, Shuhei; Morita, Masayuki; and Wakashima, Yoshiaki, 4,977,441, Cl. 357-70.000.
Wakata, Hitoshi: *See*—
Nakatani, Hajime; Minowa, Yoshibumi; and Wakata, Hitoshi, 4,977,563, Cl. 372-32.000.
Wake, Kiyoyasu, to Yoshida Kogyo K. K. Dial lock assembly. 4,976,121, Cl. 70-68.000.
Wake, Kiyoyasu: *See*—
Terada, Yasuharu; Horita, Yoshiyuki; Ishii, Susumu; and Wake, Kiyoyasu, 4,976,120, Cl. 70-68.000.
Wakisaka, Yoshiaki: *See*—
Takanashi, Kenji; and Wakisaka, Yoshiaki, 4,977,462, Cl. 358-339.000.
Waldeck, Karl: *See*—
Mensing, Hermann; Sternitzke, Reinhard; Waldeck, Karl; and Schnabel, Klaus, 4,976,676, Cl. 493-365.000.
Walder, Anthony J.; Solomon, Donald D.; Beck, Richard W.; Lambert, James M.; Ignatius, Timothy; and Crawford, Mark, to Becton, Dickinson and Company. Catheter obturator with automatic feed and control. 4,976,697, Cl. 604-164.000.
Walder, Wolfgang: *See*—
Seidl, Hans; Walder, Wolfgang; and Reinhold, Walter, 4,976,263, Cl. 128-421.000.
Waldo, Whitson G., III, to Motorola, Inc. Actinic alignment to CEM coated resist films. 4,977,048, Cl. 430-22.000.
Walker, Gordon N., to Ciba-Geigy Corporation. Tromethamine salt of 1-methyl-beta-oxo-alpha-(phenylcarbamoyl)-2-pyrrolepropionitrile. 4,977,181, Cl. 514-423.000.
Wallis, Christopher J.: *See*—
Collington, Eric W.; Hallett, Peter; Wallis, Christopher J.; Wadsworth, Alan; and Hayes, Norman F., 4,977,163, Cl. 514-317.000.
Walls, Robert R.: *See*—
Higson, James R.; D'Alfonso, David A.; and Walls, Robert R., 4,976,259, Cl. 128-200.180.
Walpert, Robert A.: *See*—
Sargeant, Bruce A.; Hoffenberg, Mark J.; Reasons, Rob; and Walpert, Robert A., 4,976,424, Cl. 272-73.000.
Walsh, Arthur. Socket wrench attachment with removable retaining means. 4,976,174, Cl. 81-125.000.
Walshe, Josephine M. A.: *See*—
Hatton, Kevin B.; Irving, Edward; Walshe, Josephine M. A.; and Mallaband, Anne, 4,977,293, Cl. 558-153.000.
Wang, Chun T., to Teledyne Industries, Inc. Process for coextrusion billets with multiple metallic cylindrical layers by hot isostatic pressing and product. 4,977,034, Cl. 428-548.000.
Wang, Patrick S., to Johnson Electric S.A. Electric motor commutator secured to rotor by confined epoxy. 4,977,343, Cl. 310-42.000.
Wang, Paul Y. Implant for percutaneous sampling of serous fluid and for delivering drug upon external compression. 4,976,695, Cl. 604-132.000.
Wang, Pen-Chung, to Shell Oil Company. Polyarylate polymers. 4,977,235, Cl. 528-220.000.
Wantuck, Paul J., to United States of America, Energy. Near-perfect diffraction grating rhomb. 4,977,560, Cl. 372-2.000.
Ward, Billy W.; Edwards, David, Jr.; and Casella, Robert A., to Micrion Corporation. Particle beam shielding. 4,976,843, Cl. 204-298.360.
Ward, George C.; Wilson, Thomas N.; and Sinha, Uday F., to Southwire Company. Smoother continuous cast steel bar product. 4,977,037, Cl. 428-577.000.
Ward Machinery Company, The: *See*—
Harrison, John R.; and Van Noy, John R., 4,976,672, Cl. 493-130.000.
Warner-Lambert Company: *See*—
Chen, Evan N., 4,976,028, Cl. 30-49.000.
Johnson, Stephen J.; and Moos, Walter H., 4,977,172, Cl. 514-374.000.
Sanchez, Joseph P.; and Trehan, Ashok K., 4,977,154, Cl. 514-254.000.
Warnstrom, Arne: *See*—
Norrvi, Hans; Warnstrom, Arne; and Wuopio, Jan-Erik, 4,976,183, Cl. 89-1.819.
Wash, Larry G.: *See*—
Granger, Edward M.; Hamilton, John F., Jr.; and Wash, Larry G., 4,977,458, Cl. 358-456.000.
Wash, Michael L.; and Whitfield, Arthur A., to Eastman Kodak Company. Self-clocking encoding/decoding film information exchange system using dedicated magnetic tracks on film. 4,977,419, Cl. 354-76.000.
Washa, John G. Strips of came and method for producing the same. 4,977,010, Cl. 428-83.000.
Washington University: *See*—
Smith, William H., 4,976,542, Cl. 356-346.000.
Washio, Kunihiko: *See*—
Kishida, Shunji; Yokoyama, Hiroyuki; Morishige, Yukio; and Washio, Kunihiko, 4,976,930, Cl. 422-186.300.
Waste-Not, Inc.: *See*—
Quam, Roger C., 4,976,375, Cl. 220-534.000.
Watabe, Kiyoto: *See*—
Okamoto, Tatsuo; Kotani, Hideo; Oono, Takio; Watabe, Kiyoto; Kinoshita, Yasushi; and Nishikawa, Yoshikazu, 4,977,105, Cl. 437-190.000.
Watanabe, Akihide: *See*—
Nakajima, Tadakatsu; Kuwahara, Heikichi; Ohashi, Shigeo; Satoh, Motohiro; Yamada, Toshihiro; Kasai, Kenichi; Kobayashi, Satomi; and Watanabe, Akihide, 4,977,444, Cl. 357-82.000.
Watanabe, Fumihiko: *See*—
Narisada, Masayuki; Ohtani, Mitsuaki; Watanabe, Fumihiko; Hagishita, Sanji; Seno, Kaoru; and Kamata, Susumu, 4,976,891, Cl. 260-401.000.
Watanabe, Hiroyuki, to Tomy Kogyo Co., Inc. Device for starting a toy. 4,976,650, Cl. 446-418.000.
Watanabe, Michihiro: *See*—
Nagata, Tatsuya; Yamada, Takehiko; Hara, Eiichi; and Watanabe, Michihiro, 4,977,313, Cl. 250-208.100.
Watanabe, Minoru: *See*—
Tsunoda, Takeo; Takeo, Setsu; Nobusawa, Tatsuya; Enomoto, Norihide; Takahashi, Hiroyasu; Watanabe, Minoru; Sasaki, Yutaka; and Tanaka, Kunihiro, 4,976,941, Cl. 423-247.000.

Watanabe, Mutsuo: *See—*
Tani, Tatsuo; and Watanabe, Mutsuo, 4,977,429, Cl. 355-260.000.
Watanabe, Naotaka: *See—*
Hosoya, Yoshio; Watanabe, Naotaka; Takagi, Isao; and Miyoshi, Atsuo, 4,977,208, Cl. 524-515.000.
Watanabe, Rikizo: *See—*
Ohno, Takehiro; and Watanabe, Rikizo, 4,976,791, Cl. 148-404.000.
Watanabe, Satoshi: *See—*
Amano, Shigeru; Takarabe, Tsuyoshi; Oda, Hiroshi; Nakamori, Takashi; Watanabe, Satoshi; and Taira, Masamichi, 4,976,780, Cl. 75-375.000.
Watanabe, Shingo, to Tel Sagani Limited. Heat treatment apparatus. 4,976,613, Cl. 432-241.000.
Watanabe, Tetsuaki: *See—*
Okura, Toshihiko; Hirao, Kouji; Watanabe, Tetsuaki; and Kashihara, Kouji, 4,976,508, Cl. 350-96.230.
Watanabe, Toshiaki: *See—*
Iguchi, Kazuo; Soejima, Tetsuo; Watanabe, Toshiaki; and Amemiya, Shigeo, 4,977,558, Cl. 370-112.000.
Watanabe, Yoshiaki: *See—*
Komori, Shin; Zauma, Jun; and Watanabe, Yoshiaki, 4,977,412, Cl. 346-108.000.
Water Parks, Inc.: *See—*
Davis, Walter R.; and Nahrup, Todd H., 4,976,570, Cl. 405-79.000.
Water Works Supply Corporation: *See—*
Carter, William, 4,976,457, Cl. 285-158.000.
Wates, Peter J.: *See—*
Kneen, Geoffrey; Jackson, William P.; Islip, Peter J.; and Wates, Peter J., 4,977,188, Cl. 514-575.000.
Watkins, Joseph J.; Fagerburg, David R.; Lawrence, Paul B.; and Rule, Mark, to Eastman Kodak Company. Process for the preparation of copoly(arylene sulfide) having a decreased amount of disulfide radicals. 4,977,224, Cl. 525-471.000.
Watkins, Joseph J.: *See—*
Fagerburg, David R.; Watkins, Joseph J.; Lawrence, Paul B.; and Rule, Mark, 4,977,236, Cl. 528-226.000.
Watson, Stuart L., Jr., to Union Carbide Chemicals and Plastics Company, Inc. Low temperature crosslinking of water-borne resins. 4,977,219, Cl. 525-329.500.
Wax, Cyrus T., to Scully-Jones, Corp. Rope-tying device and method. 4,976,013, Cl. 24-129.00R.
W+E Umwelttechnik AG: *See—*
Steiner, Hansruedi; and Weber, Hans, 4,976,206, Cl. 110-171.000.
Weber, Hans: *See—*
Steiner, Hansruedi; and Weber, Hans, 4,976,206, Cl. 110-171.000.
Weber, Heinz: *See—*
Frey, Otto; Semlitsch, Manfred; and Weber, Heinz, 4,976,738, Cl. 623-16.000.
Webwer, Theodor A.; and Kummer, Wolfgang, to Bayer Aktiengesellschaft. Oxygen-containing molybdenum metal powder and processes for its preparation. 4,976,779, Cl. 75-363.000.
Wechs, Friedbert, to Akzo N.V. Integral asymmetric polyether-sulfone membrane, process for its production, and use for ultrafiltration and microfiltration. 4,976,859, Cl. 210-500.230.
Wee, Siok-Hui H., to ICI Americas Inc. Substituted 2,4-dioxodiazolidines and -thiadiazolidines and their use as herbicides. 4,977,270, Cl. 548-314.000.
Wegener, Bernd: *See—*
Bicz, Wieslaw, 4,977,601, Cl. 382-4.000.
Weidemann, Michael H.: *See—*
Schmeling, Edith L.; Roschenbleck, Benno; and Weidemann, Michael H., 4,976,830, Cl. 204-58.400.
Weiskopf, Hubert: *See—*
Sachse, Bruno; Weiskopf, Hubert; Engel, Joachim; and Zintel, Jakob, 4,976,914, Cl. 376-391.000.
Weiss, Ekkehard: *See—*
Jolidon, Synese; Locher, Rita; Kompis, Ivan; Weiss, Ekkehard; and Wyss, Pierre-Charles, 4,977,265, Cl. 544-363.000.
Weiss, Ervin: *See—*
Rosenberg, Melvyn; Eli, Ilana; and Weiss, Ervin, 4,976,951, Cl. 424-7.100.
Weiss, Ladislaus: *See—*
Martell, William A.; Weiss, Ladislaus; VanJaarsveld, Robert P.; and Brown, Colin R., 4,976,400, Cl. 249-134.000.
Weisshaupt, Herbert P.; Orth, Hans; Lips, Hendrik R.; and Scheideler, Wilfried, to Rheinmetall GmbH. Warhead with casing and liner forming an integral unit. 4,976,203, Cl. 102-476.000.
Weissman, Bernard. Inherently nonrotating reciprocating dental tool. 4,976,625, Cl. 433-118.000.
Welch, Albert B.; and Scott, Marion W., to LTV Aerospace and Defense Co. Method and apparatus for laser frequency stabilization. 4,977,562, Cl. 372-32.000.
Wella Aktiengesellschaft: *See—*
Lang, Gunther; and Wendel, Harald, 4,976,952, Cl. 424-47.000.
Wellington, Carol: *See—*
Stratton, William; and Wellington, Carol, 4,977,495, Cl. 364-200.000.
Wendel, Harald: *See—*
Lang, Gunther; and Wendel, Harald, 4,976,952, Cl. 424-47.000.
Wermuth, Camille G.: *See—*
Biziere, Kathleen; Wermuth, Camille G.; Worms, Paul; and Bourguignon, Jean-Jacques, 4,977,152, Cl. 514-232.800.
Werner, Gerhard, to Hoechst AG. Modified cyclopentadiene resin, processes for its preparation, and its use. 4,976,783, Cl. 106-20.000.
Werner, Hans: *See—*
Jost, Gerhard; and Werner, Hans, 4,977,526, Cl. 364-567.000.
Werner, Jan: *See—*
Van Der Scheer, Albert; and Werner, Jan, 4,976,856, Cl. 210-490.000.
Werner, Oskar O., to Teledyne Kinetics. Zero insertion force dual in-line LCD connector. 4,976,629, Cl. 439-259.000.
Werner, Rainer A.: *See—*
Kerth, Juergen; Werner, Rainer A.; Zolk, Ralf; Ruempler, Klaus-Dieter; Schweier, Guenther; Mueller-Mall, Rudolf; and Gruber, Wolfgang, 4,977,210, Cl. 525-53.000.
Wess, Gunther; Kesseler, Kurt; Baader, Ekkehard; and Beck, Gerhard, to Hoechst Aktiengesellschaft. Process for the preparation of optically active 3-demethylmevalonic acid derivatives, and intermediates. 4,977,279, Cl. 549-274.000.
Wesson, Caren L.; and Mandell, Colleen J. Bubble forming and bath soap dispensing device. 4,976,645, Cl. 446-15.000.
Western Forms, Inc.: *See—*
Carlson, Michael G., 4,976,401, Cl. 249-194.000.
Westfal, Horst; and Ruben, F. B., to Felix Schoeller Jr. GmbH & Co. KG. Process for the production of a support material for light-sensitive materials with an anti-curl layer. 4,977,065, Cl. 430-271.000.
Westinghouse Elecric Corp.: *See—*
Nothnick, Carl E., 4,977,405, Cl. 342-162.000.
Westinghouse Electric Corp.: *See—*
Binstock, Morton H.; and Shaltes, Walter B., 4,976,108, Cl. 60-660.000.
Fornof, James D., 4,976,446, Cl. 277-198.000.
Gregg, Gerald L.; Putman, Richard E.; and Gomola, John W., 4,977,529, Cl. 364-578.000.
Lee, Richard M., 4,976,100, Cl. 60-39.020.
Toperzer, Edward S., 4,977,345, Cl. 310-242.000.
Westvaco Corporation: *See—*
Calvert, Barry G.; and Diedrich, Dan D., 4,976,797, Cl. 156-69.000.
Schilling, Peter, 4,976,784, Cl. 106-277.000.
Weyerhaeuser Company: *See—*
Smith, Carol L., 4,977,011, Cl. 428-152.000.
Whirlpool Corporation: *See—*
Manson, Larry J.; and Goslee, Michael D., 4,977,394, Cl. 340-679.000.
White, Barbara E. Maternity garment with two-position support band. 4,976,653, Cl. 450-155.000.
White, Eugene W.; and Shors, Edwin C., to Interpore International. Coated biomaterials and methods for making same. 4,976,736, Cl. 623-16.000.
White, R. C., to Sundstrand Corporation. Power switching apparatus. 4,977,332, Cl. 307-113.000.
Whitfield, Arthur A.: *See—*
Wash, Michael L.; and Whitfield, Arthur A., 4,977,419, Cl. 354-76.000.
Whitman, Anthony T. Device for removing rings from fingers. 4,976,034, Cl. 30-370.000.
Whittenberger, William A.: *See—*
Cornelison, Richard C.; and Whittenberger, William A., 4,976,929, Cl. 422-174.000.
Wichman, William J.: *See—*
Mackay, Frederick G.; and Wichman, William J., 4,976,530, Cl. 351-44.000.
Wichman, William John: *See—*
Mackay, Frederick G.; and Wichman, William J., 4,976,530, Cl. 351-44.000.
Wickersham, Colleen A.: *See—*
Wickersham, Wayne M.; Wickersham, Colleen A.; Diener, Kevin G.; Diener, JoAnn S.; and Skogler, Brian, 4,976,448, Cl. 280-47.200.
Wickersham, Wayne M.; Wickersham, Colleen A.; Diener, Kevin G.; Diener, JoAnn S.; and Skogler, Brian, to Right Products, Inc. Mobile cooler chest and cooler chest support. 4,976,448, Cl. 280-47.200.
Wiechert, Rudolf: *See—*
Jungblut, Peter; Wiechert, Rudolf; and Bittler, Dieter, 4,977,147, Cl. 514-171.000.
Wieneke, James E., to Apollo Hair Systems, Inc. Apparatus for styling hair replacement. 4,976,621, Cl. 434-94.000.
Wieringa, Johannes H., to Akzo N.V. Dibenzoxepinon and dibenzothiepino-pyridinol or - pyrrotol derivatives with anti-depressant action. 4,977,158, Cl. 514-285.000.
Wiesner, Matthias: *See—*
Leupold, Ernst I.; Wiesner, Matthias; Schlingmann, Merten; and Rapp, Knut, 4,977,283, Cl. 549-484.000.
Wiff, Donald R.: *See—*
Arnold, Fred E.; Helminiak, Thaddeus E.; Wiff, Donald R.; Tan, Loon S.; Hwang, Wen F.; and Chuah, Hoe, 4,977,223, Cl. 525-432.000.
Wikner, Erland, to Stiga Aktiebolag. Table game. 4,976,434, Cl. 273-85.00B.
Wildfang, Dieter; and Nehm, Holger, to Dieter Wildfang KG. Fluid flow regulator. 4,976,283, Cl. 137-504.000.
Wiley, Jeffrey D. Device adapted for cleaning dust, grime and the like from a surface such as a skylight. 4,976,000, Cl. 15-220.00R.
Wilhelmus van Steijn, Theodorus G., to P. Boer & Zn. B.V. Apparatus for clamping pipe or tube. 4,976,482, Cl. 294-102.100.
Wilkie, Lawrence A. Life ring. 4,976,642, Cl. 441-131.000.
Willan, W. Craig. Method of testing for fuselage cracks. 4,976,136, Cl. 73-40.700.
Willer, Rodney L.: *See—*
Biddle, Richard A.; and Willer, Rodney L., 4,976,794, Cl. 149-19.500.

Willert, Hans-Georg; and Burgi, Maja, to Sulzer Brothers Limited. Reinforcement for a bone cement bed. 4,976,728, Cl. 623-22.000.
Willett, Paul E., to APV Baker Pty Ltd. Bread molders. 4,976,600, Cl. 425-151.000.
Willging, Stephen M.: *See*—
Baldwin, William S.; Willging, Stephen M.; and Siegel, Brock M., 4,977,282, Cl. 549-412.000.
Wm. Wrigley Jr. Company: *See*—
Patel, Mansukh M.; Chisari, Paul R.; and Broderick, Kevin B., 4,976,972, Cl. 426-3.000.
Williams, Ann S.: *See*—
Bach, Wolf; Ferrier, Donald R.; Kukanskis, Peter E.; Williams, Ann S.; and Senechal, Mary J., 4,976,990, Cl. 427-98.000.
Williams, Daniel E.: *See*—
Black, David; Black, Caron J.; and Williams, Daniel E., 4,975,993, Cl. 4-601.000.
Williams, Geoffrey A., to Topline Leisure Ltd. Prize dispensing machine providing the appearance of discharging prizes as a matter of chance. 4,976,376, Cl. 221-24.000.
Williams, George A.: *See*—
Kelley, James O.; Williams, George A.; Kurrasch, Andrew J.; and Hollington, Geoffrey A., 4,976,502, Cl. 312-322.000.
Williams International Corporation: *See*—
Jones, John F., 4,976,669, Cl. 475-248.000.
Williams, John: *See*—
Langdon, Albert K.; Learmont, Robert O.; Robinson, Darrell; Goozen, Robert; Lewis, Michael; Williams, John; Pruehs, Allen V.; and Shincovich, John T., 4,977,482, Cl. 361-366.000.
Williams, William H. Cleaning apparatus. 4,976,003, Cl. 15-372.000.
Williamson, Robert E.; McHugh, Carl M.; and Hood, Clarence E., to Clemson University. Harvesting machinery. 4,976,094, Cl. 56-330.000.
Williamson, Weldon S., to Hughes Aircraft Company. Plasma generator having rf driven cathode. 4,977,352, Cl. 315-111.810.
Williamson, Weldon S.: *See*—
Eckhardt, Wilfred O.; Williamson, Weldon S.; Hancock, Donald J.; and Robson, Ronald R., 4,977,329, Cl. 250-551.000.
Willis, Peter M.: *See*—
Murrer, Barry A.; Overstall, John; and Willis, Peter M., 4,976,831, Cl. 204-98.000.
Wilson, Alan D.: *See*—
Ellis, John; Nicholson, John W.; and Wilson, Alan D., 4,976,829, Cl. 204-38.700.
Wilson, Alexander I., to Ian Wilson Technology Limited. Leaf spring production. 4,976,125, Cl. 72-21.000.
Wilson, David A.: *See*—
Simon, Jaime; Garlich, Joseph R.; Wilson, David A.; and McMillan, Kenneth, 4,976,950, Cl. 424-1.100.
Wilson, Thomas N.: *See*—
Ward, George C.; Wilson, Thomas N.; and Sinha, Uday F., 4,977,037, Cl. 428-577.000.
Wilson, Timothy J., to Motorola, Inc. Channel selection in a multi-frequency radio data communication system. 4,977,612, Cl. 455-166.000.
Wilson, Wilfred W.: *See*—
Myers, Jimmy; and Wilson, Wilfred W., 4,977,156, Cl. 514-255.000.
Wilson, William N.: *See*—
Carpenter, Robert B.; and Wilson, William N., 4,976,316, Cl. 166-291.000.
Winkler, Otmar: *See*—
Hans, Rudiger; and Winkler, Otmar, 4,976,659, Cl. 474-111.000.
Winslow, John M., to Minnesota Mining and Manufacturing Company. Transparentizable antihalation layers. 4,977,070, Cl. 430-510.000.
Winzenz, Wayne L.; and Hackett, Brian K., to 501 Balance Dynamics Corporation. Computerized control system and method for balancers. 4,977,510, Cl. 364-463.000.
Wirth, Eugene A.: *See*—
Bartoes, Robert J.; and Wirth, Eugene A., 4,976,419, Cl. 270-45.000.
Wischniewski, Martin: *See*—
Block, Juergen; Feicho, Lutz; Sobe, Alwin; and Wischniewski, Martin, 4,976,965, Cl. 424-456.000.
Wise, Jeffrey A.; and Naperski, Charles E. Receptacle lid securing device. 4,976,371, Cl. 220-315.000.
Wisotzki, Klaus-Dieter; Schumann, Klaus; Engelskirchen, Konard; and Hase, Brigitte, to Henkel Kommanditgesellschaft auf Aktien. Liquid preparations for cleaning hard surfaces. 4,976,885, Cl. 252-174.170.
Wissmann, Michael: *See*—
Schierling, Roland; Wissmann, Michael; Nickel, Hans; and Geyer, Werner, 4,976,246, Cl. 123-509.000.
Wita Products Limited: *See*—
Phillips, Wilson C.; Germann, Anita; and Olm, Orville J., 4,976,196, Cl. 100-233.000.
Witco Corporation: *See*—
Croce, Michael R.; and Brilliant, Stuart D., 4,977,193, Cl. 521-85.000.
Wixon, Philip A. M.; and Clarke, Denis K. C., to Lucas Industries Public Limited Company. Ammunition feed. 4,976,185, Cl. 89-35.010.
Woehr, Otto: *See*—
Kienzle, Wolfgang; Sauer, Rudolf; and Woehr, Otto, 4,976,145, Cl. 73-204.220.
Wolf, Gottfried: *See*—
Kappelhof, Heinrich; and Wolf, Gottfried, 4,976,575, Cl. 409-233.000.
Wolf, Irmelin: *See*—
Klein, Walter; and Wolf, Irmelin, 4,977,115, Cl. 501-107.000.
Wollmann, Gerhard: *See*—
Jeromin, Lutz; Peukert, Eberhard; Gutsche, Bernhard; Wollmann, Gerhard; and Schleper, Bernard, 4,976,892, Cl. 260-410.700.
Wollweber, Detlef; Brandes, Wilhelm; and Dutzmann, Stefan, to Bayer Aktiengesellschaft. Fungicidal 3-cyano-4-phenyl-pyrroles. 4,977,182, Cl. 514-423.000.
Wolters, Gunter: *See*—
Knop, Klaus; and Wolters, Gunter, 4,976,611, Cl. 432-181.000.
Won, Jae-Yop, to Won, Jae-Yop. Foot-operated toilet seat lifting and lowering mechanism. 4,975,988, Cl. 4-251.000.
Wong, Patrick S. L.: *See*—
Theeuwes, Felix; and Wong, Patrick S. L., 4,976,966, Cl. 424-473.000.
Wong, Raphael C.: *See*—
Ngo, That T.; and Wong, Raphael C., 4,977,077, Cl. 435-7.000.
Wood, Glenn P., to Ilford Limited. Method of preparing laminated holograms. 4,976,799, Cl. 156-106.000.
Wood, John S.: *See*—
Kovacevic, Steven; Miller, James R.; Veal, Loraine E.; and Wood, John S., 4,977,089, Cl. 435-252.310.
Woodard, Floyd E., to Monsanto Company. Optical element for a vehicle windshield. 4,976,503, Cl. 350-1.700.
Woodard, Winfred L., III: *See*—
Travis, Jonathan A.; and Woodard, Winfred L., III, 4,977,035, Cl. 428-550.000.
Worms, Paul: *See*—
Biziere, Kathleen; Wermuth, Camille G.; Worms, Paul; and Bourguignon, Jean-Jacques, 4,977,152, Cl. 514-232.800.
Wright, Charles W., to Tamworth Plastics Limited. Wiper blades, spring elements and articles including such spring elements. 4,976,001, Cl. 15-250.200.
Wright, Stanley H. B.: *See*—
Houghton, Peter G.; and Wright, Stanley H. B., 4,977,258, Cl. 540-548.000.
Wright State University: *See*—
Faghri, Amir, 4,976,308, Cl. 165-10.000.
Wroble, Marie H.: *See*—
Fahnestock, Stephen R.; Lee, Timothy; and Wroble, Marie H., 4,977,247, Cl. 530-387.000.
Wu, Edward T. H.: *See*—
Goodwin, James M.; Rosen, Bruce E.; Vidal, Jacques J.; Mackenzie, John D.; and Wu, Edward T. H., 4,977,340, Cl. 365-49.000.
Wu, Shun C. Multi-storied parking apparatus. 4,976,581, Cl. 414-257.000.
Wuepper, Thomas E.; Grauherr, Keith R.; Tate, Orren R.; and Philo, Alfred D., to CMI International, Inc. Method of and apparatus for forming sand molds. 4,976,303, Cl. 164-29.000.
Wuopio, Jan-Erik: *See*—
Norrvi, Hans; Warnstrom, Arne; and Wuopio, Jan-Erik, 4,976,183, Cl. 89-1.819.
Wyatt, Richard: *See*—
Smith, David W.; Cotter, David; and Wyatt, Richard, 4,977,620, Cl. 455-619.000.
Wyss, Pierre-Charles: *See*—
Jolidon, Synese; Locher, Rita; Kompis, Ivan; Weiss, Ekkehard; and Wyss, Pierre-Charles, 4,977,265, Cl. 544-363.000.
Xerox Corporation: *See*—
LeBlanc, Ewart O., 4,976,802, Cl. 756-273.500.
Pepe, Martin J., 4,977,411, Cl. 346-108.000.
"XI" Information Processing Systems Ltd.: *See*—
Levy, Nessim I.; Dyn, Nira; and Rippa, Samuel, 4,976,035, Cl. 33-1.00A.
Xunmei, Yuan: *See*—
Koulin, Ge; Yunzhu, Wang; Xunmei, Yuan; and Peiming, Huang, 4,977,087, Cl. 435-240.470.
Xycom, Inc.: *See*—
Borkowicz, Neil L.; and Moore, Craig A., 4,977,532, Cl. 364-708.000.
Yabumoto, Junsuke: *See*—
Yano, Hisashi; Yabumoto, Junsuke; and Kuwavara, Ryuzi, 4,976,854, Cl. 210-168.000.
Yagihara, Morio; Okada, Hisashi; Katoh, Kazunobu; and Inoue, Nobuaki, to Fuji Photo Film Co., Ltd. Silver halide photographic materials. 4,977,062, Cl. 430-264.000.
Yagishita, Takahiro: *See*—
Shimada, Kazuyuki; Niito, Yoshiharu; Kiya, Yikitoshi; Yagishita, Takahiro; Miyamoto, Masayoshi; Azumai, Hideo; and Iwasaki, Keiichi, 4,977,414, Cl. 346-154.000.
Yale Security Inc.: *See*—
Dixon, David; and Surko, Walter E., Jr., 4,976,480, Cl. 292-353.000.
Yamada, Hitoshi; Endo, Ken; and Kotani, Kikuo, to Toyo Jozo Company, Ltd. Aqueous elcatonin solution composition. 4,977,139, Cl. 514-11.000.
Yamada, Takehiko: *See*—
Nagata, Tatsuya; Yamada, Takehiko; Hara, Eiichi; and Watanabe, Michihiro, 4,977,313, Cl. 250-208.100.
Yamada, Toshihiro: *See*—
Nakajima, Tadakatsu; Kuwahara, Heikichi; Ohashi, Shigeo; Satoh, Motohiro; Yamada, Toshihiro; Kasai, Kenichi; Kobayashi, Satomi; and Watanabe, Akihide, 4,977,444, Cl. 357-82.000.
Yamada, Yoshitaka: *See*—
Iijima, Toshifumi; Yamada, Yoshitaka; Kumashiro, Kenji; Akamatsu, Hideo; and Kamio, Takashi, 4,977,069, Cl. 430-506.000.
Yamada, Yuichi: *See*—
Tsuruta, Kozo; and Yamada, Yuichi, 4,976,601, Cl. 425-182.000.

Yamaga, Hiroyoshi: *See*—
Matsumoto, Yuto; Yamaga, Hiroyoshi; Akuzawa, Noboru; and Obara, Toshio, 4,977,249, Cl. 534-696.000.
Yamagishi, Mikio: *See*—
Suzuki, Hirohisa; Kabashima, Akira; Yamagishi, Mikio; and Ogawa, Ryuichi, 4,977,615, Cl. 455-277.000.
Yamaguchi, Morio; Kudoh, Yasunori; and Nakazato, Takashi, to Max Co., Ltd. Very small displacement enlargement mechanism and printing head using the same. 4,976,553, Cl. 400-124.000.
Yamaguchi, Shigeru: *See*—
Higuchi, Noboru; Kobayashi, Chuzo; Ichikawa, Yasunori; Matsui, Keizo; and Yamaguchi, Shigeru, 4,976,377, Cl. 222-55.000.
Ichikawa, Yasunori; Yamaguchi, Shigeru; Ohnishi, Hiroshi; Kojima, Akira; and Kato, Akira, 4,976,404, Cl. 251-121.000.
Yamaguchi, Takashi: *See*—
Nishi, Naomi; Kami, Shigetake; and Yamaguchi, Takashi, 4,976,918, Cl. 420-546.000.
Yamaha Hatsudoki Kabushiki Kaisha: *See*—
Grinde, James E., 4,976,638, Cl. 440-57.000.
Hirata, Akira; and Masumoto, Iwao, 4,976,462, Cl. 236-345.000.
Yamakawa, Hideaki: *See*—
Ibe, Hiroyuki; and Yamakawa, Hideaki, 4,977,561, Cl. 372-23.000.
Yamamoto Chemicals, Incorporated: *See*—
Sukawa, Hiroshi; Hirose, Sumio; Takahara, Shigeru; and Sasakawa, Tomoyoshi, 4,977,064, Cl. 430-270.000.
Yamamoto, Hiroshi: *See*—
Yamamoto, Takashi; and Yamamoto, Hiroshi, 4,976,126, Cl. 72-83.000.
Yamamoto, Masato; Yamanaka, Toshimasa; and Nakajima, Masahiro, to Asahi Kogaku Kogyo Kabushiki Kaisha. Indicating apparatus within finder of camera. 4,977,425, Cl. 354-474.000.
Yamamoto, Naoki: *See*—
Motoi, Yoshihiko; Yamamoto, Naoki; and Takano, Yukio, 4,977,307, Cl. 219-392.000.
Yamamoto, Saburo; Hosoda, Masahiro; Sasaki, Kazuaki; and Kondo, Masaki, to Sharp Kabushiki Kaisha. Semiconductor laser device. 4,977,568, Cl. 372-46.000.
Yamamoto, Takashi; and Yamamoto, Hiroshi, to Kabushiki Kaisha Yamamoto Kinzoku Seisakusho. Spinning machine. 4,976,126, Cl. 72-83.000.
Yamamoto, Tetuo: *See*—
Morita, Mitsuhiko; Toda, Yasuhiko; and Yamamoto, Tetuo, 4,977,024, Cl. 428-404.000.
Yamamoto, Yorihisa: *See*—
Hayashi, Kiyotaka; Handa, Etsumi; Yamamoto, Yorihisa; and Tanaka, Hiroshi, 4,976,170, Cl. 74-866.000.
Yamamoto, Yoshinori: *See*—
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; and Mikami, Nakao, 4,976,705, Cl. 604-304.000.
Aki, Osami; Yamamoto, Yoshinori; Matsuoka, Masayoshi; Tachibana, Hideki; and Tanase, Setsumi, 4,976,706, Cl. 604-304.000.
Yamamoto, Yosuke: *See*—
Kayane, Yutaka; Omura, Takashi; Harada, Naoki; Mori, Yasuji; Yamamoto, Yosuke; Miyamoto, Tetsuya; and Kusumoto, Takehiro, 4,977,261, Cl. 544-199.000.
Yamamoto, Youichi: *See*—
Ogata, Hiromichi; and Yamamoto, Youichi, 4,977,500, Cl. 364-200.000.
Yamamura, Takashi: *See*—
Takanashi, Itsuo; Ichitou, Toshikatsu; Kitamura, Hiroki; Yamamura, Takashi; Sakagami, Koubun; and Nakano, Atsushi, 4,977,417, Cl. 346-160.000.
Yamamuro, Kiyohiko: *See*—
Okazaki, Masaki; Yamamuro, Kiyohiko; Koizumi, Shigeo; and Shiba, Keisuke, 4,977,076, Cl. 430-583.000.
Yamanaka, Akihiro; Iida, Hiroshi; and Nozawa, Minoru, to Canon Kabushiki Kaisha. Ink remain detector having a flexible member and a liquid injection recording apparatus utilizing the detector. 4,977,413, Cl. 346-140.00R.
Yamanaka, Motosuke: *See*—
Oinuma, Hitoshi; Yamanaka, Motosuke; Miyake, Kazutoshi; Hoshiko, Tomonori; Minami, Norio; and Shoji, Tadao, 4,977,165, Cl. 514-318.000.
Yamanaka, Toshimasa: *See*—
Yamamoto, Masato; Yamanaka, Toshimasa; and Nakajima, Masahiro, 4,977,425, Cl. 354-474.000.
Yamanari, Hiroshi; and Fujisawa, Nobuhiko, to Ryobi, Ltd. Reverse side printing device employing sheet feed cylinder in sheet-fed printer. 4,976,197, Cl. 101-137.000.
Yamanouchi, Glenn T.; and Orillo, Stephen, Jr., to United States of America, Navy. Assembly for detecting and recording surface contour data. 4,976,036, Cl. 33-23.030.
Yamanouchi Pharmaceutical Co., Ltd.: *See*—
Ohta, Mitsuaki; Koide, Tokuo; Suzuki, Takeshi; Matsuhisa, Akira; Yanagisawa, Isao; and Miyata, Keiji, 4,977,175, Cl. 514-394.000.
Yamasawa, Kimiko: *See*—
Yasukawa, Takuji; Yasumura, Daisuke; Yamasawa, Kimiko; Tanaka, Yukitaka; and Nishide, Tsutomu, 4,976,984, Cl. 426-602.000.
Yamashita, Shinichi: *See*—
Morimitu, Yasumasa; and Yamashita, Shinichi, 4,976,998, Cl. 427-284.000.
Yamashita, Takuo: *See*—
Tanaka, Koichi; Yamashita, Takuo; Yamaue, Satoshi; and Nakaya, Hiroaki, 4,977,350, Cl. 313-505.000.
Yamato, Motoyuki: *See*—
Sugawara, Tomoo; and Yamato, Motoyuki, 4,977,226, Cl. 526-122.000.
Yamauchi, Osamu: *See*—
Suzuki, Toshiaki; Murakami, Yoji; Kobayashi, Masao; and Yamauchi, Osamu, 4,977,442, Cl. 357-70.000.
Yamaue, Satoshi: *See*—
Tanaka, Koichi; Yamashita, Takuo; Yamaue, Satoshi; and Nakaya, Hiroaki, 4,977,350, Cl. 313-505.000.
Yamazaki, Hiroko: *See*—
Sakaki, Masaharu; and Yamazaki, Hiroko, 4,976,775, Cl. 71-106.000.
Yamazaki, Satoshi: *See*—
Fujimori, Shinichiro; Yamazaki, Satoshi; Sugano, Mamoru; Kawamura, Makoto; Ninomiya, Kunihiro; Tobe, Akihiro; and Nitta, Issei, 4,977,151, Cl. 514-225.500.
Yamazaki, Seiji, to Fanuc Limited. Motor-operated die clamping mechanism of an injection-molding machine. 4,976,602, Cl. 425-188.000.
Yamura, Tetsuaki: *See*—
Hirakawa, Nobuhiko; Kashiwaba, Noriaki; Matsumoto, Hajime; Hosoda, Akihiko; Sekine, Yasuo; Isowa, Yoshikazu; Yamura, Tetsuaki; Sekine, Akihiro; and Nishikawa, Masashi, 4,977,267, Cl. 546-272.000.
Yanagihara, Masaaki; Taniguchi, Katsutoshi; and Fujita, Masakazu, to Teijin Limited. Level-dyeable mix-spun false-twisted yarn. 4,976,097, Cl. 57-208.000.
Yanagisawa, Isao: *See*—
Ohta, Mitsuaki; Koide, Tokuo; Suzuki, Takeshi; Matsuhisa, Akira; Yanagisawa, Isao; and Miyata, Keiji, 4,977,175, Cl. 514-394.000.
Yanagishita, Norio, to Ikeda Bussan Co., Ltd. Method of producing skin-covered foamed plastic article. 4,976,414, Cl. 264-40.300.
Yang, Tai-Her. Manual electric tool. 4,976,173, Cl. 81-54.000.
Yannuzzi, Gilbert N., Jr.; and Muhs, Jeffrey D., to American Packaging Corporation. Bag and method of making the same. 4,976,674, Cl. 493-195.000.
Yano, Hisashi; Yabumoto, Junsuke; and Kuwavara, Ryuzi, to Mitsubishi Oil Co., Ltd. Oil filter II. 4,976,854, Cl. 210-168.000.
Yano, Kohsaku: *See*—
Sawada, Kazuyuki; Ogawa, Hisashi; Yano, Kohsaku; and Fujita, Tsutomu, 4,977,104, Cl. 437-162.000.
Yano, Norio; and Ishiguro, Ginya, to Nippon Telegraph and Telephone Corporation. Magnetic card. 4,977,040, Cl. 428-692.000.
Yano, Toshisada: *See*—
Matsumura, Hiromu; Yano, Toshisada; Matsushita, Akira; and Eigyo, Masami, 4,977,167, Cl. 514-326.000.
Yashima Chemical Industrial Co., Ltd.: *See*—
Suzuki, Junji; Ishida, Tatsuya; Toda, Kazuya; Ikeda, Tatsufumi; Tsukidate, Yokichi; and Yasuo, Kikuchi, 4,977,171, Cl. 514-365.000.
Yasuda, Masahiro. Hair clip. 4,976,277, Cl. 132-279.000.
Yasuda, Shinichiro: *See*—
Honjo, Toshio; Sato, Yuji; Fukushima, Yoshihiro; Nawa, Masayoshi; and Yasuda, Shinichiro, 4,977,054, Cl. 430-108.000.
Yasukawa, Takuji; Yasumura, Daisuke; Yamasawa, Kimiko; Tanaka, Yukitaka; and Nishide, Tsutomu, to Kao Corporation. Edible oil/fat compositions. 4,976,984, Cl. 426-602.000.
Yasumura, Daisuke: *See*—
Yasukawa, Takuji; Yasumura, Daisuke; Yamasawa, Kimiko; Tanaka, Yukitaka; and Nishide, Tsutomu, 4,976,984, Cl. 426-602.000.
Yasuo, Kikuchi: *See*—
Suzuki, Junji; Ishida, Tatsuya; Toda, Kazuya; Ikeda, Tatsufumi; Tsukidate, Yokichi; and Yasuo, Kikuchi, 4,977,171, Cl. 514-365.000.
Yates, Cleon R., to CRYCO Twenty-Two, Inc. Purge cantilevered wafer loading system for LP CVD processes. 4,976,610, Cl. 432-11.000.
Yazaki Corporation: *See*—
Kudo, Shigeji; Suzuki Sanae; Mirota, Hideaki; and Suzuki, Hiroo, 4,976,294, Cl. 140-102.000.
Yazaki, Takashi; and Takuma, Kazunori, to Tokyo Tanabe Company, Ltd. Aqueous preparation of 9-methyl-3-(1H-tetrazol-5-yl)-4H-pyrido[1,2-a])pyrimidin-4-one potassium salt. 4,977,157, Cl. 514-258.000.
Yeazel, Kenneth L., to Crane Carrier Company. Fast sweep power cylinder for refuse trucks. 4,976,187, Cl. 91-173.000.
Yen, Richard C. K. Apparatus for vacuum cleaner with uninterrupted and undiminished performance. 4,976,758, Cl. 55-350.000.
Yennadhiou, Peter: *See*—
Cassidy, Stephen A.; and Yennadhiou, Peter, 4,976,505, Cl. 350-96.150.
Yeomans, Allan J. Tool mounting assembly. 4,976,566, Cl. 403-374.000.
Yetter, Lloyd E. Facility for livestock, fowl and other animals. 4,976,221, Cl. 119-20.000.
Yntema, Everardus G. M., to Stork Friesland B.V. Method for the cyclic preparation of a length of curds and installation for carrying out this method. 4,976,980, Cl. 426-495.000.
Yoder, Douglas J.; Brown, Ronald E.; Stevenson, Paul E.; Hornback, Donald L.; and Leisure, Ronald K., to Delco Electronics Corporation. Monolithic pressure sensitive integrated circuit. 4,977,101, Cl. 437-51.000.
Yokogawa, Fumihiko, to Pioneer Electronic Corporation. Method and apparatus for identifying the type of servo system to be used with a given disc. 4,977,553, Cl. 369-44.260.
Yokota, Akira, to Olympus Optical Co., Ltd. Image pickup system for an endoscope using a first filter matched to a frequency of a fiber

array and a second matched to a frequency of an image pickup device. 4,977,450, Cl. 358-98.000.

Yokoyama, Hiroyuki: *See*—
Kishida, Shunji; Yokoyama, Hiroyuki; Morishige, Yukio; and Washio, Kunihiko, 4,976,930, Cl. 422-186.300.

Yokozawa, Seiichi, to Pioneer Electronic Corporation. Signal reproducing device which offsets the tracking error signal. 4,977,469, Cl. 360-77.010.

Yoshida Kogyo K. K.: *See*—
Akashi, Shunji; and Oda, Kiyoshi, 4,976,014, Cl. 24-421.000.
Ishii, Susumu, 4,976,015, Cl. 24-429.000.
Terada, Yasuharu; Horita, Yoshiyuki; Ishii, Susumu; and Wake, Kiyoyasu, 4,976,120, Cl. 70-68.000.
Wake, Kiyoyasu, 4,976,121, Cl. 70-68.000.

Yoshida Kogyo K.K.: *See*—
Takabatake, Hideo, 4,976,016, Cl. 24-433.000.

Yoshida, Masato: *See*—
Ishida, Tetsuro; Danno, Yoshiaki; Togai, Kazuhide; Ando, Hiromitsu; Sanbayashi, Daisuke; Yoshida, Masato; Shiraishi, Kazuhiro; Tsukamoto, Tokihiro; Takemura, Jun; and Koujina, Eiichi, 4,976,241, Cl. 123-425.000.

Yoshida, Mizuo: *See*—
Segoshi, Kazuo; Okuda, Toshiyuki; Okamura, Kenji; and Yoshida, Mizuo, 4,976,529, Cl. 351-41.000.

Yoshida, Yoshihiro: *See*—
Oki, Yoshinari; Tanaka, Takeshi; Tuno, Ryoji; and Yoshida, Yoshihiro, 4,976,130, Cl. 72-269.000.

Yoshihara, Toru: *See*—
Kakimoto, Norihiro; Nakamura, Kunie; and Yoshihara, Toru, 4,977,287, Cl. 556-83.000.

Yoshihira, Noboru, to Nissan Motor Company, Ltd. Vehicle body front or rear end structure for mounting shock-absorbing type bumper. 4,976,481, Cl. 293-133.000.

Yoshiji, Yuzo: *See*—
Iwasaki, Takao; Horikoshi, Katsumi; and Yoshiji, Yuzo, 4,976,825, Cl. 203-71.000.

Yoshikawa, Nobuyoshi; and Asano, Hiroshi, to Teikoku Hume Pipe Co., Ltd.; and Noritake Co., Limited. Centrifugally molded concrete composite pipe. 4,976,291, Cl. 138-175.000.

Yoshikawa, Shoichi; Awazu, Yasunobu; and Nishimura, Eiji, to Dainippon Screen Mfg. Co., Ltd. Method of and apparatus for supplying replenishers to automatic processor. 4,977,067, Cl. 430-398.000.

Yoshikoshi, Hideo: *See*—
Kitamura, Hajime; Takeuchi, Masaru; and Yoshikoshi, Hideo, 4,976,540, Cl. 356-38.000.

Yoshimura, Shushichi: *See*—
Kanamaru, Shinichi; Yoshimura, Shushichi; Hisashi, Hideyuki; and Sakaue, Akinori, 4,976,945, Cl. 423-450.000.

Yoshimura, Tatsushiro; Tomihashi, Nobuyuki; and Simasaki, Shuhei, to Daikin Industries, Ltd. Powders of tetrafluoroethylene copolymer and process for preparing the same. 4,977,221, Cl. 525-356.000.

Yoshimura, Toshiyuki; Takeda, Eiji; Matsuoka, Hideyuki; and Igura, Yasuo, to Hitachi, Ltd. Semiconductor device with a split conduction channel. 4,977,435, Cl. 357-23.500.

Yoshino Kogyosho Co., Ltd.: *See*—
Iizuka, Shigeo; and Saito, Tadao, 4,976,563, Cl. 401-176.000.

Yoshioka, Tetsuo: *See*—
Hisanaga, Akinori; Sakubata, Takashi; and Yoshioka, Tetsuo, 4,976,547, Cl. 366-169.000.

Yoshizawa, Toru: *See*—
Kagiya, Tsutomu; Abe, Mitsuyuki; Nishimoto, Seiichi; Shibamoto, Yuta; Otomo, Susumu; Tanami, Tohru; Shimokawa, Kazuhiro; Yoshizawa, Toru; and Hisanaga, Yorisato, 4,977,273, Cl. 548-339.000.

Young, Douglas L.: *See*—
McAllan, John D.; and Young, Douglas L., 4,976,039, Cl. 33-285.000.

Young, Patrick, to Insight Telecast, Inc. System and process for VCR scheduling. 4,977,455, Cl. 358-142.000.

Young, William J. Lawn edging system and associated edging components. 4,976,063, Cl. 47-33.000.

Yu, Hyunkyu; Kang, Sangwon; and Lee, Jinhyo, to Korea Electronics & Communications Research Inst. Method of forming a self-aligned bipolar transistor using amorphous silicon. 4,977,098, Cl. 437-31.000.

Yuki, Eiji: *See*—
Kuzuya, Susumu; Shimizu, Seiji; Kato, Mikio; Ishikawa, Yujiro; Sakai, Takashi; and Yuki, Eiji, 4,976,558, Cl. 400-615.200.

Yuki, Ikuo: *See*—
Shiomi, Makoto; Ohsawa, Michitaka; Sakamoto, Toshiyuki; Matsumi, Kuninori; Ozeki, Kosuke; Yuki, Ikuo; and Sato, Kenji, 4,977,446, Cl. 358-60.000.

Yumoto, Toshiyuki: *See*—
Ashikawa, Noboru; and Yumoto, Toshiyuki, 4,976,668, Cl. 475-221.000.

Yunzhu, Wang: *See*—
Koulin, Ge; Yunzhu, Wang; Xunmei, Yuan; and Peiming, Huang, 4,977,087, Cl. 435-240.470.

Zadrazil, Frantisek: *See*—
Hutterman, Aloys; Majcherczyk, Andrzej; and Zadrazil, Frantisek, 4,977,090, Cl. 435-266.000.

Zainullin, Albert G.: *See*—
Abdrakhmanov, Gabrashit S.; Zainullin, Albert G.; Arzamastsev, Filipp G.; Uteshev, Rashid A.; Ibat Ullin, Rustam K.; Jusupov, Izil G.; Perov, Anatoly V.; Mavljutov, Midkhat R.; Sannikov, Rashit K.; Galiakbarov, Vil F.; and Urazgildin, Ilyas A., 4,976,322, Cl. 175-57.000.

Zaklika, Krzysztof A.: *See*—
Jongewaard, Susan K.; Smith, Terrance P.; Leichter, Louis M.; and Zaklika, Krzysztof A., 4,977,134, Cl. 503-227.000.

Zaporozhsky Avtomobilny ZaVod "Kommunar" (Proizvodstvennoe Objedinenie "AV to ZAZ" : *See*—
Averin, Gennady V., 4,976,309, Cl. 165-42.000.

Zaripov, Vladilen K.: *See*—
Gershuni, Alexandr N.; Maisotsenko, Valery S.; Kaminnik, Alexandr A.; Zaripov, Vladilen K.; Nischik, Alexandr P.; and Levterov, Alexandr I., 4,976,113, Cl. 62-314.000.

Zaromb, Solomon, to United States of America, Energy. Liquid-absorption preconcentrator sampling instrument. 4,977,095, Cl. 436-178.000.

Zauma, Jun: *See*—
Komori, Shin; Zauma, Jun; and Watanabe, Yoshiaki, 4,977,412, Cl. 346-108.000.

Zdanowicz, Lawrence E.: *See*—
Bland, Gerald F.; Mondek, Martin J.; and Zdanowicz, Lawrence E., 4,976,640, Cl. 440-61.000.

Zegel, Douglas R.; Jensen, Gary S.; Hernick, Mark R.; and Daniels, Michael J., to Art Guild, Inc. Wall system and method of construction. 4,976,080, Cl. 52-239.000.

Zeiler, Hans-Jonchim: *See*—
Schriewer, Michael; Croche, Klaus; Zeiler, Hans-Jonchim; and Hetzner, Karl G., 4,977,263, Cl. 544-329.000.

Zelle, Bruce R.: *See*—
Nichols, Robert K.; and Zelle, Bruce R., 4,977,582, Cl. 375-118.000.

Zembrod, Alfred: *See*—
Schlossmann, Klas; Zembrod, Alfred; Kazda, Stanislav; Serno, Peter; and Klinksiek, Bernd, 4,976,964, Cl. 424-450.000.

Zempo, Yasunari: *See*—
Maeda, Takayoshi; Hata, Masahiko; Zempo, Yasunari; Fukuhara, Noboru; and Takata, Hiroaki, 4,976,216, Cl. 118-728.000.

Zentner, Gaylen M.: *See*—
McClelland, Gregory A.; Zentner, Gaylen M.; and Pogany, Stefano A., 4,976,967, Cl. 424-473.000.

Zeppenfeld, Josef: *See*—
Setzer, Helmut; Sprenger, Axel; and Zeppenfeld, Josef, 4,976,129, Cl. 72-247.000.

Ziegler, Eldon W., to Noise Cancellation Technologies, Inc. Sound attenuation system for personal seat. 4,977,600, Cl. 381-71.000.

Ziegler, Sidney, to Budoff Outdoor Furniture, Inc. Foldable outdoor chair. 4,976,492, Cl. 297-31.000.

Zimmermann, Georg: *See*—
Dobler, Klaus; Hachtel, Hansjorg; and Zimmermann, Georg, 4,976,160, Cl. 74-862.360.

Zimmermann, Leon M., to Dantex Explosives (Proprietary) Limited. Explosive composition. 4,976,793, Cl. 149-21.000.

Zimpro/Passavant Inc.: *See*—
Ross, David S., 4,976,873, Cl. 210-744.000.

Zinser Textilmaschinen GmbH: *See*—
Konig, Herbert; and Dinkelmann, Friedrich, 4,977,331, Cl. 250-560.000.

Zintel, Jakob: *See*—
Sachse, Bruno; Weiskopf, Hubert; Engel, Joachim; and Zintel, Jakob, 4,976,914, Cl. 376-391.000.

Zipperian, Thomas E.: *See*—
Huffman, Dennis D.; Hughes, Robert C.; Kelsey, Charles A.; Lane, Richard; Ricco, Antonio J.; Snelling, Jay B.; and Zipperian, Thomas E., 4,976,266, Cl. 128-659.000.

Zodrow, Rudolf: *See*—
Tomashauer, Josef; Zodrow, Rudolf; and Buchholz, Rainer, 4,976,803, Cl. 156-297.000.

Zolk, Ralf: *See*—
Kerth, Juergen; Werner, Rainer A.; Zolk, Ralf; Ruempler, Klaus-Dieter; Schweier, Guenther; Mueller-Mall, Rudolf; and Gruber, Wolfgang, 4,977,210, Cl. 525-53.000.

Zorner, Paul S.: *See*—
Turner, James A.; Jacks, Wendy S.; and Zorner, Paul S., 4,976,772, Cl. 71-92.000.

Zucholl, Klaus: *See*—
Ammende, Sonya; Erdmann, Hartmut; Etzkorn, Heinz-Werner; and Zucholl, Klaus, 4,976,991, Cl. 427-125.000.

Zucker, Armand S.; Breslow, David S.; and Giebel, Harald, to RTC Industries, Inc. Merchandise display stand. 4,976,360, Cl. 211-186.000.

501 Balance Dynamics Corporation: *See*—
Winzenz, Wayne L.; and Hackett, Brian K., 4,977,510, Cl. 364-463.000.

LIST OF REISSUE PATENTEES

TO WHOM

PATENTS WERE ISSUED ON THE 11TH DAY OF DECEMBER, 1990

NOTE.—Arranged in accordance with the first significant character or word of the name (in accordance with city and telephone directory practice).

Berner, Godwin; and Slongo, Mario, to Ciba-Geigy Corporation. Photolytically cleavable, N-acylated sterically hindered amines. Re. 33,489, Cl. 546-20.000.

Boger, Bentley J.: *See*—
Ziecker, Roger A.; Boger, Bentley J.; and Lewis, Dwayne N., Re. 33,481, Cl. 239-298.000.

Ciba-Geigy Corporation: *See*—
Berner, Godwin; and Slongo, Mario, Re. 33,489, Cl. 546-20.000.

Continental Can Company, Inc.: *See*—
Guss, Theodore; and Fu, Sing, Re. 33,480, Cl. 222-207.000.

Cook, Robert D.: *See*—
Hirzel, Edgar A.; and Cook, Robert D., Re. 33,486, Cl. 364-426.020.

Dow Chemical Company, The: *See*—
Johnston, Howard; and Troxell, Lillian H., Re. 33,478, Cl. 71-94.000.

Frimer, Itzchak, to Scopus Optical Industry. Lighted gun sights. Re. 33,485, Cl. 362-84.000.

Fu, Sing: *See*—
Guss, Theodore; and Fu, Sing, Re. 33,480, Cl. 222-207.000.

Guss, Theodore; and Fu, Sing, to Continental Can Company, Inc. Pump and container assembly. Re. 33,480, Cl. 222-207.000.

Hirzel, Edgar A.; and Cook, Robert D., to Hydro-Aire Div. of Crane Company. Selective deceleration brake control system. Re. 33,486, Cl. 364-426.020.

Hydro-Aire Div. of Crane Company: *See*—
Hirzel, Edgar A.; and Cook, Robert D., Re. 33,486, Cl. 364-426.020.

Imanaka, Yoshiaki, to Sharp Kabushiki Kaisha. Cleaning device for a monochromatic copying machine. Re. 33,484, Cl. 355-298.000.

Johnston, Howard; and Troxell, Lillian H., to Dow Chemical Company, The. Pyridyl(oxy/thio)phenoxy compounds herbicidal compositions and methods. Re. 33,478, Cl. 71-94.000.

Juptner, William F.; Macy, David F.; and Staudte, Juergen H., to Piezoelectric Technology Investors. Vibratory angular rate sensing system. Re. 33,479, Cl. 73-505.000.

Kabushiki Kaisha Sankyo Seiki Seisakusho: *See*—
Kamijo, Masao, Re. 33,483, Cl. 360-96.300.

Kamijo, Masao, to Tokyo Pigeon Co., Ltd.; and Kabushiki Kaisha Sankyo Seiki Seisakusho. Tape recorder. Re. 33,483, Cl. 360-96.300.

Kobayashi, Noboru, to Yamaha Hatsudoki Kabushiki Kaisha. Marine vessel with internal combustion engine having an exhaust pipe. Re. 33,488, Cl. 440-47.000.

Lewis, Dwayne N.: *See*—
Ziecker, Roger A.; Boger, Bentley J.; and Lewis, Dwayne N., Re. 33,481, Cl. 239-298.000.

Macy, David F.: *See*—
Juptner, William F.; Macy, David F.; and Staudte, Juergen H., Re. 33,479, Cl. 73-505.000.

Marks, Colin E., to Palintest Limited. Water treatment and soil testing. Re. 33,487, Cl. 422-61.000.

Mulder, Douglas C.; and O'Ryan, David E., to Nordson Corporation. Adjustable powder spray gun. Re. 33,482, Cl. 239-707.000.

Nordson Corporation: *See*—
Mulder, Douglas C.; and O'Ryan, David E., Re. 33,482, Cl. 239-707.000.
Ziecker, Roger A.; Boger, Bentley J.; and Lewis, Dwayne N., Re. 33,481, Cl. 239-298.000.

O'Ryan, David E.: *See*—
Mulder, Douglas C.; and O'Ryan, David E., Re. 33,482, Cl. 239-707.000.

Palintest Limited: *See*—
Marks, Colin E., Re. 33,487, Cl. 422-61.000.

Piezoelectric Technology Investors: *See*—
Juptner, William F.; Macy, David F.; and Staudte, Juergen H., Re. 33,479, Cl. 73-505.000.

Scopus Optical Industry: *See*—
Frimer, Itzchak, Re. 33,485, Cl. 362-84.000.

Sharp Kabushiki Kaisha: *See*—
Imanaka, Yoshiaki, Re. 33,484, Cl. 355-298.000.

Slongo, Mario: *See*—
Berner, Godwin; and Slongo, Mario, Re. 33,489, Cl. 546-20.000.

Staudte, Juergen H.: *See*—
Juptner, William F.; Macy, David F.; and Staudte, Juergen H., Re. 33,479, Cl. 73-505.000.

Tokyo Pigeon Co., Ltd.: *See*—
Kamijo, Masao, Re. 33,483, Cl. 360-96.300.

Troxell, Lillian H.: *See*—
Johnston, Howard; and Troxell, Lillian H., Re. 33,478, Cl. 71-94.000.

Yamaha Hatsudoki Kabushiki Kaisha: *See*—
Kobayashi, Noboru, Re. 33,488, Cl. 440-47.000.

Ziecker, Roger A.; Boger, Bentley J.; and Lewis, Dwayne N., to Nordson Corporation. Adhesive spray gun and nozzle attachment. Re. 33,481, Cl. 239-298.000.

LIST OF REEXAMINATION PATENTEES

TO WHOM

CERTIFICATES WERE ISSUED

Bradley, Ralph H., Jr.: *See*—
McKechnie, Thomas S.; Goldenberg, Jill F.; Eskin, Joshua D.; Shimizu, Jeffrey A.; Bradley, Ralph H., Jr.; and Guerinot, William F., B1 4,864,390, Cl. 358-60.000.

Eskin, Joshua D.: *See*—
McKechnie, Thomas S.; Goldenberg, Jill F.; Eskin, Joshua D.; Shimizu, Jeffrey A.; Bradley, Ralph H., Jr.; and Guerinot, William F., B1 4,864,390, Cl. 358-60.000.

Goldenberg, Jill F.: *See*—
McKechnie, Thomas S.; Goldenberg, Jill F.; Eskin, Joshua D.; Shimizu, Jeffrey A.; Bradley, Ralph H., Jr.; and Guerinot, William F., B1 4,864,390, Cl. 358-60.000.

Guerinot, William F.: *See*—
McKechnie, Thomas S.; Goldenberg, Jill F.; Eskin, Joshua D.; Shimizu, Jeffrey A.; Bradley, Ralph H., Jr.; and Guerinot, William F., B1 4,864,390, Cl. 358-60.000.

McKechnie, Thomas S.; Goldenberg, Jill F.; Eskin, Joshua D.; Shimizu, Jeffrey A.; Bradley, Ralph H., Jr.; and Guerinot, William F., to North American Philips Corporation. Display system with equal path lengths. B1 4,864,390, 12-11-90, Cl. 358-60.000.

North American Philips Corporation: *See*—
McKechnie, Thomas S.; Goldenberg, Jill F.; Eskin, Joshua D.; Shimizu, Jeffrey A.; Bradley, Ralph H., Jr.; and Guerinot, William F., B1 4,864,390, Cl. 358-60.000.

Shimizu, Jeffrey A.: *See*—
McKechnie, Thomas S.; Goldenberg, Jill F.; Eskin, Joshua D.; Shimizu, Jeffrey A.; Bradley, Ralph H., Jr.; and Guerinot, William F., B1 4,864,390, Cl. 358-60.000.

LIST OF DESIGN PATENTEES

Aaldenberg, Eric: *See—*
Hawes, Robert E., Jr.; and Aaldenberg, Eric, 312,841, Cl. D19-34.100.

Adams, Richard; and Fayerman, Peter, to Baldwin Hardware Corporation. Handle for a door or the like. 312,762, 12-11-90, Cl. D8-308.000.

Adler Instrument Company: *See—*
Davison, John A.; and Kellar, Robert J., 312,874, Cl. D24-28.000.

Air Products and Chemicals, Inc.: *See—*
Becker, Joseph S.; McAfee, Arthur J.; Wells, Mark B.; Kidd, Thomas C.; and Mullane, John C., Jr., 312,869, Cl. D23-415.000.

Alco Industries, Inc.: *See—*
Goetz, Charles R., 312,895, Cl. D30-129.000.
Goetz, Charles R., 312,896, Cl. D30-130.000.

Alkco Manufacturing Company: *See—*
Brown, Tobias, 312,886, Cl. D26-63.000.

American National Can Company: *See—*
Cochran, Donald D.; and Cornell, Stephen W., 312,784, Cl. D9-434.000.

Andersen, Edel S., to Interlego A.G. Toy building element. 312,846, 12-11-90, Cl. D21-108.000.

Anderson, Donald A.; and Sun, Donald J. C., to Sun, Donald J. C., a part interest. Putter head. 312,858, 12-11-90, Cl. D21-219.000.

Arai, Takuya; and Nakada, Kimiaki, to Fuji Photo Film Co., Ltd. Package for a disposable camera. 312,782, 12-11-90, Cl. D9-432.000.

Asics Corporation: *See—*
Okada, Yoshihiro, 312,723, Cl. D2-318.000.

Aten, Michael R., to IMED Corporation. Combined volumetric pump and controller. 312,879, 12-11-90, Cl. D24-51.000.

Auttajark, Somboon, to Eagle Hygienic Rubber Co. Toothbrush back and handle unit. 312,729, 12-11-90, Cl. D4-104.000.

B. R. L. Inc.: *See—*
Meyer, Boyd L., 312,854, Cl. D21-189.000.

Baldwin Hardware Corporation: *See—*
Adams, Richard; and Fayerman, Peter, 312,762, Cl. D8-308.000.

Ball, Laurence G.: *See—*
Price, Macy J.; Ball, Laurence G.; Price, Macy J., Jr.; and Johnson, Mack E., 312,840, Cl. D19-90.000.

Bayat, Bijan. Extension cord locking device. 312,818, 12-11-90, Cl. D13-156.000.

Becker, Joseph S.; McAfee, Arthur J.; Wells, Mark B.; Kidd, Thomas C.; and Mullane, John C., Jr., to Air Products and Chemicals, Inc. Oxy-fuel burner for use in a metallurgical furnace. 312,869, 12-11-90, Cl. D23-415.000.

Bedard, Marc E. Artificial tree cover for septic tank vent pipe. 312,802, 12-11-90, Cl. D11-118.000.

Benoit-Pequignet, Emile; and Viennet, Jean-Pierre, to Montres Emile Pequignet. Wristwatch. 312,791, 12-11-90, Cl. D10-32.000.

Berkan, William A., Jr. Combined flexible web, buckles and mounting panel for immobilizing objects. 312,770, 12-11-90, Cl. D8-354.000.

Beverly Hills Trading Company, Inc.: *See—*
Rezek, Ron, 312,868, Cl. D23-377.000.

Bialo, Walter, to Ventura Travelware, Inc. Luggage case. 312,728, 12-11-90, Cl. D3-76.000.

Bisbing, Robert H., to Southco, Inc. Push-button keylatch. 312,769, 12-11-90, Cl. D8-338.000.

Black & Decker, Inc.: *See—*
Osit, Robert, 312,743, Cl. D7-309.000.

Blanco GmbH & Co. KG: *See—*
Jung, Karl-Heinz; and Muck, Manfred, 312,748, Cl. D7-367.000.

Blue Giant Equipment Corporation: *See—*
Larsen, Kurt K.; and Santiago, Pete, 312,909, Cl. D34-34.000.

Bodai, Balazs I.; and Briggs, Stephen. Neonatal suction valve. 312,880, 12-11-90, Cl. D24-53.000.

Boddin, Geert R.; Vandendriessche, Jean-Pierre; and Witdoek, Daniel C., to Ford New Holland, Inc. Operator cab for an agricultural machine. 312,827, 12-11-90, Cl. D15-30.000.

Bonaldo, S.p.A.: *See—*
Hoffmann, Jochen, 312,735, Cl. D6-335.000.

Boyd, John R., Jr.; and Boyd, Michael D. Ball game goal. 312,856, 12-11-90, Cl. D21-201.000.

Boyd, Michael D.: *See—*
Boyd, John R., Jr.; and Boyd, Michael D., 312,856, Cl. D21-201.000.

Bra, S.A.: *See—*
Moreno, Mariano G., 312,751, Cl. D7-358.000.

Bradrick, Gary D.; and Guthrie, Robert B., to Spectramed, Inc. Syringe jacket with plunger handle. 312,873, 12-11-90, Cl. D24-25.000.

Briggs, Stephen: *See—*
Bodai, Balazs I.; and Briggs, Stephen, 312,880, Cl. D24-53.000.

Brown, Paul D.: *See—*
Miller, David E.; and Brown, Paul D., 312,722, Cl. D2-314.000.

Brown, Tobias, to Alkco Manufacturing Company. Adjustable lighting fixture. 312,886, 12-11-90, Cl. D26-63.000.

Cain, Ann S., to 'Totes', Incorporated. Umbrella handle. 312,724, 12-11-90, Cl. D3-12.000.

Calibron, Inc.: *See—*
Wherry, Dennis P.; O'Brien, Martin C.; Horian, Robert L.; and McPherson, Bruce M., 312,864, Cl. D23-214.000.

Campbell, John M. Battery cable connector clamp. 312,812, 12-11-90, Cl. D13-120.000.

Canare Electric Co., Ltd.: *See—*
Takizawa, Takeshi, 312,813, Cl. D13-133.000.
Takizawa, Takeshi, 312,814, Cl. D13-133.000.

Cannon, Kerry: *See—*
Russell, V. Lee; and Cannon, Kerry, 312,900, Cl. D32-14.000.

Casio Computer Co., Ltd.: *See—*
Fujiwara, Yoh, 312,793, Cl. D10-39.000.
Kobayashi, Naoki, 312,833, Cl. D18-7.000.

Cerniglia, Michael. Razor. 312,861, 12-11-90, Cl. D28-46.000.

CertainTeed Corporation: *See—*
Westphal, Dennis; and Piles, Jonathan, 312,882, Cl. D25-124.000.

Cincinnati Milacron Inc.: *See—*
Kemp, James J., 312,821, Cl. D14-100.000.

Claber S.p.A.: *See—*
Roman, Gianfranco, 312,730, Cl. D4-115.000.

Clark, Randall B.; and Remick, Edward M., to Michelin Recherche et Technique. Tire. 312,809, 12-11-90, Cl. D12-147.000.

Coats & Clark, Inc.: *See—*
Wolff, Joan P., 312,758, Cl. D7-675.000.
Wolff, Joan P., 312,759, Cl. D7-675.000.

Cochran, Donald D.; and Cornell, Stephen W., to American National Can Company. Base cup for bottles. 312,784, 12-11-90, Cl. D9-434.000.

Collins, Thomas J.; and Nieves, Anthony L., to Keptel, Inc. Telephone network interface apparatus. 312,820, 12-11-90, Cl. D14-240.000.

Colvin, David S. Adjustable socket. 312,760, 12-11-90, Cl. D8-29.000.

Compton, Wayne W., to Kidde Consumer Durables Corporation. Luminaire. 312,890, 12-11-90, Cl. D26-69.000.

Cornell, Stephen W.: *See—*
Cochran, Donald D.; and Cornell, Stephen W., 312,784, Cl. D9-434.000.

Courreges, Andre, to Courreges Design. Combined bottle and cap. 312,777, 12-11-90, Cl. D9-375.000.

Courreges Design: *See—*
Courreges, Andre, 312,777, Cl. D9-375.000.

Coutta, John M., to Visual Communication Productions Inc. Photographic transparency holder. 312,830, 12-11-90, Cl. D16-237.000.

Creed, Gerald J.: *See—*
Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., 312,905, Cl. D32-71.000.
Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., 312,906, Cl. D32-71.000.
Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., 312,907, Cl. D32-71.000.

Crisci, Louis. Cake shield. 312,756, 12-11-90, Cl. D7-610.000.

Daenen, Robert H. C. M.; and DeCoster, Pieter J. K., to Dart Industries Inc. Covered pitcher or the like. 312,745, 12-11-90, Cl. D7-317.000.

Dart Industries Inc.: *See—*
Daenen, Robert H. C. M.; and DeCoster, Pieter J. K., 312,745, Cl. D7-317.000.

Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., to SSMC Inc. Steam iron sole plate for high nap fabrics or similar article. 312,905, 12-11-90, Cl. D32-71.000.

Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., to SSMC Inc. Steam iron sole plate for accommodating buttons and pleats or similar article. 312,906, 12-11-90, Cl. D32-71.000.

Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., to SSMC Inc. Steam iron sole plate for accommodating zippers or similar article. 312,907, 12-11-90, Cl. D32-71.000.

Davison, John A.; and Kellar, Robert J., to Adler Instrument Company. Surgical rasp insert. 312,874, 12-11-90, Cl. D24-28.000.

Davisson, Paul D., to Nelson Irrigation Corporation. Sprinkler water distributor. 312,865, 12-11-90, Cl. D23-214.000.

DeCoster, Pieter J. K.: *See—*
Daenen, Robert H. C. M.; and DeCoster, Pieter J. K., 312,745, Cl. D7-317.000.

Decra Stone, Inc.: *See—*
Jeresano, Eva S., 312,910, Cl. D34-42.000.
Jeresano, Evelyn H., 312,911, Cl. D34-42.000.

Demarest, Scott W., to S. C. Johnson & Son, Inc. Bottle. 312,780, 12-11-90, Cl. D9-412.000.

Diver Viss S.r.l.: *See—*
Magistretti, Ludovico, 312,887, Cl. D26-65.000.

Dupro AG: *See—*
Worwag, Peter, 312,904, Cl. D32-32.000.

Duratec Corporation: *See—*
Holm, Ronald A., 312,835, Cl. D19-33.000.

Eagle Hygienic Rubber Co.: *See—*
Auttajark, Somboon, 312,729, Cl. D4-104.000.

Eastman Kodak Company: *See—*
LaCourt, Michael W.; Townsend, Ensley E.; and Pfaff, Douglas J., 312,823, Cl. D14-121.000.

Eastman, Michael, to Roux Laboratories, Inc. Bottle. 312,768, 12-11-90, Cl. D9-338.000.

Eberts, Allen F., to TonJon Company, The. Wall-mounted hair dryer. 312,892, 12-11-90, Cl. D28-12.000.

Ebsco Industries, Inc.: *See—*
Gowing, Jim, 312,859, Cl. D22-132.000.

Eke, Alan B.; Eke, Daniel A.; and Johnson, Earl. Bathtub for handicapped. 312,867, 12-11-90, Cl. D23-281.000.

Eke, Daniel A.: *See—*
Eke, Alan B.; Eke, Daniel A.; and Johnson, Earl, 312,867, Cl. D23-281.000.

Engineered Data Products, Inc.: *See—*
Price, Macy J.; Ball, Laurence G.; Price, Macy J., Jr.; and Johnson, Mack E., 312,840, Cl. D19-90.000.

ERTO S.p.A.: *See—*
Etro, Gerolamo, 312,731, Cl. D5-45.000.

Esselte Pendaflex Corporation: *See—*
Hawes, Robert E., Jr.; and Aaldenberg, Eric, 312,841, Cl. D19-34.100.

Essex, John D.; and Moine, David W., to Hoover Company, The. Vacuum cleaner. 312,902, 12-11-90, Cl. D32-24.000.

Essex, John D.; and Moine, David W., to Hoover Company, The. Vacuum cleaner. 312,903, 12-11-90, Cl. D32-24.000.

Etro, Gerolamo, to ERTO S.p A. Scarf or similar article. 312,731, 12-11-90, Cl. D5-45.000.

Etro, Gerolamo, to Etro S.p.A. Scarf or similar article. 312,732, 12-11-90, Cl. D5-45.000.

Etro, Gerolamo, to Etro S.p.A. Shawl. 312,733, 12-11-90, Cl. D5-45.000.

Etro S.p.A.: *See—*
Etro, Gerolamo, 312,732, Cl. D5-45.000.
Etro, Gerolamo, 312,733, Cl. D5-45.000.

Faulkner, Richard E. Garment drying bag. 312,899, 12-11-90, Cl. D32-8.000.

Fayerman, Peter: *See—*
Adams, Richard; and Fayerman, Peter, 312,762, Cl. D8-308.000.

Flores, Russell G. Pacifier. 312,877, 12-11-90, Cl. D24-45.000.

Flos S.p.A.: *See—*
Starck, Philippe, 312,891, Cl. D26-106.000.

Ford New Holland, Inc.: *See—*
Boddin, Geert R.; Vandendriessche, Jean-Pierre; and Witdoek, Daniel C., 312,827, Cl. D15-30.000.

Forsythe, Donald L., to NCR Corporation. Retail terminal or similar article. 312,832, 12-11-90, Cl. D18-4.000.

Friedman, Alan H., to Kanowsky Furniture, Inc. Combined table and seating unit. 312,734, 12-11-90, Cl. D6-335.000.

Fugett, Albert F. Carpenter's tool. 312,795, 12-11-90, Cl. D10-62.000.

Fuji Photo Film Co., Ltd.: *See—*
Arai, Takuya; and Nakada, Kimiaki, 312,782, Cl. D9-432.000.

Fujiwara, Yoh, to Casio Computer Co., Ltd. Wrist watch. 312,793, 12-11-90, Cl. D10-39.000.

Gaffney, Thomas E.; and Hillebrand, Thomas W., to Kohler Co. Spout. 312,866, 12-11-90, Cl. D23-255.000.

Geisha Corporation: *See—*
Swadell, Robert A., 312,889, Cl. D26-168.000.

Glassenberg, Marvin. Garment rack or similar article. 312,737, 12-11-90, Cl. D6-415.000.

Goetz, Charles R., to Alco Industries, Inc. Pet feeding dish. 312,895, 12-11-90, Cl. D30-129.000.

Goetz, Charles R., to Alco Industries, Inc. Dual compartment pet feeding dish. 312,896, 12-11-90, Cl. D30-130.000.

Gold Star Co., Ltd.: *See—*
Hong, Sa Y., 312,826, Cl. D14-135.000.

Goldfarb, Adolph E. Double-drawing toy. 312,843, 12-11-90, Cl. D21-59.000.

Goldner, Ken. Adjustable lamp. 312,888, 12-11-90, Cl. D26-65.000.

Goodman, Sheldon H.: *See—*
Greenhut, Steven E.; and Goodman, Sheldon H., 312,740, Cl. D6-536.000.

Gowing, Jim, to Ebsco Industries, Inc. Fishing lure. 312,859, 12-11-90, Cl. D22-132.000.

Greene, Anna F. Cannoli. 312,720, 12-11-90, Cl. D1-122.000.

Greenhut, Steven E.; and Goodman, Sheldon H. Soap bar holder. 312,740, 12-11-90, Cl. D6-536.000.

Grosfillex, Raymond. Stool. 312,736, 12-11-90, Cl. D6-349.000.

Guthrie, Robert B.: *See—*
Bradrick, Gary D.; and Guthrie, Robert B., 312,873, Cl. D24-25.000.

Hankammer, Heinz. Filter cartridge. 312,863, 12-11-90, Cl. D23-209.000.

Hansen, Flemming B. Razor blade holder. 312,893, 12-11-90, Cl. D28-48.000.

Hasegawa, Kohichi: *See—*
Miyata, Tomoyuki; Hasegawa, Kohichi; Sunagawa, Masao; Iwao, Akira; and Suzuki, Naruhiko, 312,901, Cl. D32-21.000.

Hasegawa, Shigeru: *See—*
Ito, Masafumi; Hasegawa, Shigeru; Sube, Minoru; and Sato, Yuji, 312,825, Cl. D14-164.000.

Hawes, Robert E., Jr.; and Aaldenberg, Eric, to Esselte Pendaflex Corporation. Bookend. 312,841, 12-11-90, Cl. D19-34.100.

Healey, Robert W., to Hill, Loren G.; and Lakes Illustrated, Inc. Electronic fishing information instrument. 312,794, 12-11-90, Cl. D10-53.000.

Herman Miller, Inc.: *See—*
Newhouse, Thomas J., 312,738, Cl. D6-446.000.

Hill, Loren G.: *See—*
Healey, Robert W., 312,794, Cl. D10-53.000.

Hillebrand, Thomas W.: *See—*
Gaffney, Thomas E.; and Hillebrand, Thomas W., 312,866, Cl. D23-255.000.

Hirota, Kimio, to Seikosha Co., Ltd. Clock. 312,788, 12-11-90, Cl. D10-10.000.

Hitachi, Ltd.: *See—*
Miyata, Tomoyuki; Hasegawa, Kohichi; Sunagawa, Masao; Iwao, Akira; and Suzuki, Naruhiko, 312,901, Cl. D32-21.000.

Hoffmann, Jochen, to Bonaldo, S.p.A. Convertible chair. 312,735, 12-11-90, Cl. D6-335.000.

Holm, Ronald A., to Duratec Corporation. Display sheet. 312,835, 12-11-90, Cl. D19-33.000.

Honda Giken Kogyo Kabushiki Kaisha: *See—*
Kohama, Mitsuyoshi; Yamase, Shinichi; and Takemori, Hiroshi, 312,807, Cl. D12-110.000.
Okano, Harumi, 312,804, Cl. D12-196.000.

Hong, Sa Y., to Gold Star Co., Ltd. Video cassette recorder. 312,826, 12-11-90, Cl. D14-135.000.

Hoover Company, The: *See—*
Essex, John D.; and Moine, David W., 312,902, Cl. D32-24.000.
Essex, John D.; and Moine, David W., 312,903, Cl. D32-24.000.

Horian, Robert L.: *See—*
Wherry, Dennis P.; O'Brien, Martin C.; Horian, Robert L.; and McPherson, Bruce M., 312,864, Cl. D23-214.000.

Huang, George Y., to Turn-Luckily International, Inc. Electrical connector or similar article. 312,816, 12-11-90, Cl. D13-147.000.

Hynbrood Pty. Limited: *See—*
Page, Robert, 312,806, Cl. D12-98.000.

Ichihashi, Toru: *See—*
Watabe, Noboru; Watanabe, Toyoshi; Iwamoto, Masatoshi; and Ichihashi, Toru, 312,822, Cl. D14-106.000.

Iida, Katsuhiro: *See—*
Sawada, Masaji; and Iida, Katsuhiro, 312,831, Cl. D18-2.000.

Ilaria, Peter V.; and Macowski, William, to Tropar Manufacturing Company, Inc. Medailion. 312,801, 12-11-90, Cl. D11-115.000.

Imai, Tokiko, to Seikosha Co., Ltd. Pendulum for a clock. 312,800, 12-11-90, Cl. D10-130.000.

IMED Corporation: *See—*
Aten, Michael R., 312,879, Cl. D24-51.000.

Ino, Seiichi, to Kawasaki Jukogyo Kabushiki Kaisha. Motorboat. 312,811, 12-11-90, Cl. D12-307.000.

Interlego A.G.: *See—*
Andersen, Edel S., 312,846, Cl. D21-108.000.

Ito, Masafumi; Hasegawa, Shigeru; Sube, Minoru; and Sato, Yuji, to Teac Corporation. Tape recorder. 312,825, 12-11-90, Cl. D14-164.000.

Ives Ideas, Inc.: *See—*
Ives, Ray C., 312,786, Cl. D10-2.000.
Ives, Ray C., 312,787, Cl. D10-2.000.

Ives, Ray C., to Ives Ideas, Inc. Combination photographic frame and clock. 312,786, 12-11-90, Cl. D10-2.000.

Ives, Ray C., to Ives Ideas, Inc. Combination photographic frame and clock. 312,787, 12-11-90, Cl. D10-2.000.

Iwamoto, Masatoshi: *See—*
Watabe, Noboru; Watanabe, Toyoshi; Iwamoto, Masatoshi; and Ichihashi, Toru, 312,822, Cl. D14-106.000.

Iwao, Akira: *See—*
Miyata, Tomoyuki; Hasegawa, Kohichi; Sunagawa, Masao; Iwao, Akira; and Suzuki, Naruhiko, 312,901, Cl. D32-21.000.

J. B. Goodhouse, Inc.: *See—*
Svee, Roy M., 312,836, Cl. D19-33.000.

Janome Sewing Machine Co. Ltd.: *See—*
Kuroki, Nobufusa, 312,829, Cl. D16-214.000.

Jeresano, Eva S., to Decra Stone, Inc. Deep bowl. 312,910, 12-11-90, Cl. D34-42.000.

Jeresano, Evelyn H., to Decra Stone, Inc. Tray. 312,911, 12-11-90, Cl. D34-42.000.

Johnson, Earl: *See—*
Eke, Alan B.; Eke, Daniel A.; and Johnson, Earl, 312,867, Cl. D23-281.000.

Johnson, Mack E.: *See—*
Price, Macy J.; Ball, Laurence G.; Price, Macy J., Jr.; and Johnson, Mack E., 312,840, Cl. D19-90.000.

Jones, Bryn. Rattle. 312,844, 12-11-90, Cl. D21-65.000.

Jorgensen, Carsten. Espresso coffee maker. 312,744, 12-11-90, Cl. D7-317.000.

Jung, Karl-Heinz; and Muck, Manfred, to Blanco GmbH & Co. KG. Cooktop. 312,748, 12-11-90, Cl. D7-367.000.

Kanowsky Furniture, Inc.: *See—*
Friedman, Alan H., 312,734, Cl. D6-335.000.

Kataoka, Isamu, to Takara Co., Ltd. Motor driven toy flower. 312,848, 12-11-90, Cl. D21-150.000.

Kataoka, Isamu, to Takara Co., Ltd. Base driving unit for toys. 312,849, 12-11-90, Cl. D21-150.000.

Kataoka, Isamu; Saitoh, Shinya; and Nakane, Shigeru, to Takara Co., Inc. Motor driven toy flower. 312,850, 12-11-90, Cl. D21-150.000.

Kataoka, Isamu, to Takara Co., Ltd. Motor driven toy flower. 312,851, 12-11-90, Cl. D21-150.000.

Kato, Kayoko, to Seikosha Co., Ltd. Clock. 312,790, 12-11-90, Cl. D10-26.000.

Kato, Kayoko, to Seikosha Co., Ltd. Pendulum for a clock. 312,798, 12-11-90, Cl. D10-130.000.

Kawasaki Jukogyo Kabushiki Kaisha: *See—*
Ino, Seiichi, 312,811, Cl. D12-307.000.

Kellar, Robert J.: *See—*
Davison, John A.; and Kellar, Robert J., 312,874, Cl. D24-28.000.

Kemp, James J., to Cincinnati Milacron Inc. Data input/output terminal. 312,821, 12-11-90, Cl. D14-100.000.

Kempher, Robert M., to Sara Lee Corporation. Combined hot dog and pretzel. 312,719, 12-11-90, Cl. D1-101.000.

Keptel, Inc.: *See—*
Collins, Thomas J.; and Nieves, Anthony L., 312,820, Cl. D14-240.000.

Kessler, William I., to Vollrath Company, Inc, The. Handle for a kitchen utensil. 312,749, 12-11-90, Cl. D7-395.000.

Keung, Wong F., to Motor Electric Manufacturing Co. Ltd. Coffee pot warmer. 312,747, 12-11-90, Cl. D7-367.000.

Kickler, Gary M.: *See—*
Younger, Ervin E.; Kickler, Gary M.; and Younger, E. Max, 312,842, Cl. D20-42.000.

Kidd, Thomas C.: *See—*
Becker, Joseph S.; McAfee, Arthur J.; Wells, Mark B.; Kidd, Thomas C.; and Mullane, John C., Jr., 312,869, Cl. D23-415.000.

Kidde Consumer Durables Corporation: *See—*
Compton, Wayne W., 312,890, Cl. D26-69.000.

Klahre, Thomas H. Combined mailbox cover and planter box. 312,912, 12-11-90, Cl. D99-29.000.

Klein, Vernon W., to Marion Laboratories, Inc. Manual vacuum filtration container for liquid specimens. 312,862, 12-11-90, Cl. D23-209.000.

Kline, Liz. Ski boot bag or the like. 312,726, 12-11-90, Cl. D3-36.000.

Kobayashi, Masaharu, to Sony Corporation. Television receiver. 312,824, 12-11-90, Cl. D14-126.000.

Kobayashi, Naoki, to Casio Computer Co., Ltd. Electronic calculator. 312,833, 12-11-90, Cl. D18-7.000.

Kohama, Mitsuyoshi; Yamase, Shinichi; and Takemori, Hiroshi, to Honda Giken Kogyo Kabushiki Kaisha. Motorcycle. 312,807, 12-11-90, Cl. D12-110.000.

Kohler Co.: *See—*
Gaffney, Thomas E.; and Hillebrand, Thomas W., 312,866, Cl. D23-255.000.

Kosako, Mikio; and Tatsuta, Youichi, to Sharp Corporation. Copying machine. 312,834, 12-11-90, Cl. D18-37.000.

Kunewalder, Nicholas P. Pocketed panel for attachment to a chair back. 312,727, 12-11-90, Cl. D3-74.000.

Kuroki, Nobufusa, to Janome Sewing Machine Co. Ltd. Combination camera and mirror. 312,829, 12-11-90, Cl. D16-214.000.

LaCourt, Michael W.; Townsend, Ensley E.; and Pfaff, Douglas J., to Eastman Kodak Company. Film cassette. 312,823, 12-11-90, Cl. D14-121.000.

Lakes Illustrated, Inc.: *See—*
Healey, Robert W., 312,794, Cl. D10-53.000.

Larsen, Kurt K.; and Santiago, Pete, to Blue Giant Equipment Corporation. Lift truck. 312,909, 12-11-90, Cl. D34-34.000.

Lazzeroni, John J.; and Lazzeroni, Melinda K. Plug mount. 312,817, 12-11-90, Cl. D13-154.000.

Lazzeroni, Melinda K.: *See—*
Lazzeroni, John J.; and Lazzeroni, Melinda K., 312,817, Cl. D13-154.000.

Lindsley, John: *See—*
Marlowe, Huston; and Lindsley, John, 312,805, Cl. D12-96.000.

Liu, Kwok H., to Transistolite Manufacturing Limited. Flashlight. 312,884, 12-11-90, Cl. D26-46.000.

Lomas, James R., to V. & E. Friedland Limited. Doorbell or similar article. 312,797, 12-11-90, Cl. D10-118.000.

L'Oreal S.A.: *See—*
Tacconelli, Ping L., 312,774, Cl. D9-352.000.
Tacconelli, Ping L., 312,775, Cl. D9-352.000.
Tacconelli, Ping L., 312,776, Cl. D9-371.000.
Tacconelli, Ping L., 312,778, Cl. D9-396.000.
Tacconelli, Ping L., 312,779, Cl. D9-403.000.

Louis, Jean-Marie W. Magnetically mounted gooseneck lamp. 312,885, 12-11-90, Cl. D26-60.000.

Lutter, Jon G. Barbecue grill. 312,746, 12-11-90, Cl. D7-337.000.

Macowski, William: *See—*
Ilaria, Peter V.; and Macowski, William, 312,801, Cl. D11-115.000.

Magistretti, Ludovico, to Diver Viss S.r.l. Hinged lamp. 312,887, 12-11-90, Cl. D26-65.000.

Mahl, Thomas. Dental suction head. 312,872, 12-11-90, Cl. D24-10.000.

Mariol, James F.: *See—*
Mariol, John V., 312,878, Cl. D24-47.000.

Mariol, John V., to Mariol, James F. Feeding bottle for baby. 312,878, 12-11-90, Cl. D24-47.000.

Marion Laboratories, Inc.: *See—*
Klein, Vernon W., 312,862, Cl. D23-209.000.

Marlowe, Huston; and Lindsley, John, to Paccar Inc. Exterior shell of a truck cab body. 312,805, 12-11-90, Cl. D12-96.000.

Marshall, Larry D., to Thermalloy, Inc. Heat sink or similar article. 312,819, 12-11-90, Cl. D13-179.000.

Matsuda, Takashi, to Takara Co., Ltd. Toy egg. 312,845, 12-11-90, Cl. D21-104.000.

Mayclin, Thomas J. Alignment device for mounting a dental model to a base cast. 312,871, 12-11-90, Cl. D24-10.000.

McAfee, Arthur J.: *See—*
Becker, Joseph S.; McAfee, Arthur J.; Wells, Mark B.; Kidd, Thomas C.; and Mullane, John C., Jr., 312,869, Cl. D23-415.000.

McPherson, Bruce M.: *See—*
Wherry, Dennis P.; O'Brien, Martin C.; Horian, Robert L.; and McPherson, Bruce M., 312,864, Cl. D23-214.000.

Meyer, Boyd L., to B. R. L. Inc. Pocket apron for a soft toy. 312,854, 12-11-90, Cl. D21-189.000.

Michelin Recherche et Technique: *See—*
Clark, Randall B.; and Remick, Edward M., 312,809, Cl. D12-147.000.

Miller, David E.; and Brown, Paul D., to Reebok International Ltd. Shoe upper. 312,722, 12-11-90, Cl. D2-314.000.

Miyata, Tomoyuki; Hasegawa, Kohichi; Sunagawa, Masao; Iwao, Akira; and Suzuki, Naruhiko, to Hitachi, Ltd. Electric vacuum cleaner. 312,901, 12-11-90, Cl. D32-21.000.

Moine, David W.: *See—*
Essex, John D.; and Moine, David W., 312,902, Cl. D32-24.000.
Essex, John D.; and Moine, David W., 312,903, Cl. D32-24.000.

Montelongo, Isaac. Tethered batting practice aid. 312,857, 12-11-90, Cl. D21-210.000.

Montres Emile Pequignet: *See—*
Benoit-Pequignet, Emile; and Viennet, Jean-Pierre, 312,791, Cl. D10-32.000.

Moreno, Mariano G., to Bra, S.A. Pressure cooker. 312,751, 12-11-90, Cl. D7-358.000.

Motion Designs, Inc.: *See—*
Okamoto, James, 312,803, Cl. D12-133.000.

Motor Electric Manufacturing Co. Ltd.: *See—*
Keung, Wong F., 312,747, Cl. D7-367.000.

Muchmore, Charles H. Portable pocket tobacco spittoon. 312,908, 12-11-90, Cl. D34-2.000.

Muck, Manfred: *See—*
Jung, Karl-Heinz; and Muck, Manfred, 312,748, Cl. D7-367.000.

Mullane, John C., Jr.: *See—*
Becker, Joseph S.; McAfee, Arthur J.; Wells, Mark B.; Kidd, Thomas C.; and Mullane, John C., Jr., 312,869, Cl. D23-415.000.

Naether, Friedrich S. Interlocking paving block. 312,881, 12-11-90, Cl. D25-113.000.

Nakada, Kimiaki: *See—*
Arai, Takuya; and Nakada, Kimiaki, 312,782, Cl. D9-432.000.

Nakane, Shigeru: *See—*
Kataoka, Isamu; Saitoh, Shinya; and Nakane, Shigeru, 312,850, Cl. D21-150.000.

National Manufacturing & Supply Corporation: *See—*
Russell, V. Lee; and Cannon, Kerry, 312,900, Cl. D32-14.000.

NCR Corporation: *See—*
Forsythe, Donald L., 312,832, Cl. D18-4.000.

NEC Corporation: *See—*
Watabe, Noboru; Watanabe, Toyoshi; Iwamoto, Masatoshi; and Ichihashi, Toru, 312,822, Cl. D14-106.000.

Nelson Irrigation Corporation: *See—*
Davisson, Paul D., 312,865, Cl. D23-214.000.

Nemeth, Bradley M., to Wendell Brooks, Inc. Computer disk file container. 312,839, 12-11-90, Cl. D19-75.000.

Newhouse, Thomas J., to Herman Miller, Inc. Credenza. 312,738, 12-11-90, Cl. D6-446.000.

Nieves, Anthony L.: *See—*
Collins, Thomas J.; and Nieves, Anthony L., 312,820, Cl. D14-240.000.

Nite-Glo Corp.: *See—*
Younger, Ervin E.; Kickler, Gary M.; and Younger, E. Max, 312,842, Cl. D20-42.000.

O'Brien, Martin C.: *See—*
Wherry, Dennis P.; O'Brien, Martin C.; Horian, Robert L.; and McPherson, Bruce M., 312,864, Cl. D23-214.000.

Odaka, Seiji, to Seikosha Co., Ltd. Pendulum for a clock. 312,799, 12-11-90, Cl. D10-130.000.

O'Donnell, Patrick J. U-shaped candle holder. 312,883, 12-11-90, Cl. D26-20.000.

Oka, Shigeo, to Pentel Kabushiki Kaisha. Writing instrument. 312,837, 12-11-90, Cl. D19-51.000.

Okada, Yoshihiro, to Asics Corporation. Cushioning piece for shoe sole. 312,723, 12-11-90, Cl. D2-318.000.

Okamoto, James, to Motion Designs, Inc. Luggage and package carrier for a wheelchair. 312,803, 12-11-90, Cl. D12-133.000.

Okano, Harumi, to Honda Giken Kogyo Kabushiki Kaisha. Automobile front door panel exterior surface. 312,804, 12-11-90, Cl. D12-196.000.

Osit, Robert, to Black & Decker, Inc. Coffee maker. 312,743, 12-11-90, Cl. D7-309.000.

Paccar Inc.: *See—*
Marlowe, Huston; and Lindsley, John, 312,805, Cl. D12-96.000.
Preslik, Theresa D.; and Sasamura, Ross, 312,810, Cl. D12-203.000.

Page, Robert, to Hynbrood Pty. Limited. Pickup truck. 312,806, 12-11-90, Cl. D12-98.000.

Parker, Kirk P. Angle gauge. 312,796, 12-11-90, Cl. D10-64.000.

Paui, Harold J. Ceiling tile section support wedge. 312,772, 12-11-90, Cl. D8-389.000.

Paulhus, Raymond. Seat cushion. 312,742, 12-11-90, Cl. D6-601.000.

Pelletier, Ralph W. Recreational vehicle awning support adapter. 312,771, 12-11-90, Cl. D8-373.000.

Pentel Kabushiki Kaisha: *See—*
Oka, Shigeo, 312,837, Cl. D19-51.000.

Pfaff, Douglas J.: *See—*
LaCourt, Michael W.; Townsend, Ensley E.; and Pfaff, Douglas J., 312,823, Cl. D14-121.000.

Piles, Jonathan: *See—*
Westphal, Dennis; and Piles, Jonathan, 312,882, Cl. D25-124.000.

Preslik, Theresa D.; and Sasamura, Ross, to Paccar Inc. Exterior shell of a truck cab step unit. 312,810, 12-11-90, Cl. D12-203.000.

Price, Macy J.; Ball, Laurence G.; Price, Macy J., Jr.; and Johnson, Mack E., to Engineered Data Products, Inc. Document holder. 312,840, 12-11-90, Cl. D19-90.000.

Price, Macy J., Jr.: *See—*
Price, Macy J.; Ball, Laurence G.; Price, Macy J., Jr.; and Johnson, Mack E., 312,840, Cl. D19-90.000.

Prodir S.A.: *See—*
Vitrac, Jean-Pierre, 312,838, Cl. D19-51.000.

Rankin, Kevin G. Bicycle pump mount. 312,808, 12-11-90, Cl. D12-114.000.

Ratajski, Michel P., to Severin Montres AG. Wristwatch. 312,792, 12-11-90, Cl. D10-32.000.

Reebok International Ltd.: *See—*
Miller, David E.; and Brown, Paul D., 312,722, Cl. D2-314.000.

Remick, Edward M.: *See*—
Clark, Randall B.; and Remick, Edward M., 312,809, Cl. D12-147.000.

Rezek, Ron, to Beverly Hills Trading Company, Inc. Combined opaque glass body and ceiling canopy for a ceiling fan. 312,868, 12-11-90, Cl. D23-377.000.

Rigby, William R., to Westvaco Corporation. Container. 312,781, 12-11-90, Cl. D9-420.000.

Roberts, John C. Litter bagging tool. 312,898, 12-11-90, Cl. D30-162.000.

Rogers, Howard D.: *See*—
Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., 312,905, Cl. D32-71.000.
Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., 312,906, Cl. D32-71.000.
Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., 312,907, Cl. D32-71.000.

Roman, Gianfranco, to Claber S.p.A. Washing brush for motor vehicles. 312,730, 12-11-90, Cl. D4-115.000.

Roux Laboratories, Inc.: *See*—
Eastman, Michael, 312,768, Cl. D9-338.000.

Russell, V. Lee; and Cannon, Kerry, to National Manufacturing & Supply Corporation. Portable rotating drain cleaner. 312,900, 12-11-90, Cl. D32-14.000.

S. C. Johnson & Son, Inc.: *See*—
Demarest, Scott W., 312,780, Cl. D9-412.000.

S. G. Owen (Northampton), Ltd.: *See*—
Souter, Neil T., 312,828, Cl. D15-199.000.

Saitoh, Shinya: *See*—
Kataoka, Isamu; Saitoh, Shinya; and Nakane, Shigeru, 312,850, Cl. D21-150.000.

Salinas, Juan A. Eyeglass clip. 312,773, 12-11-90, Cl. D8-395.000.

Santiago, Pete: *See*—
Larsen, Kurt K.; and Santiago, Pete, 312,909, Cl. D34-34.000.

Sara Lee Corporation: *See*—
Kempher, Robert M., 312,719, Cl. D1-101.000.

Sasamura, Ross: *See*—
Preslik, Theresa D.; and Sasamura, Ross, 312,810, Cl. D12-203.000.

Sato, Yuji: *See*—
Ito, Masafumi; Hasegawa, Shigeru; Sube, Minoru; and Sato, Yuji, 312,825, Cl. D14-164.000.

Sawada, Masaji; and Iida, Katsuhiro, to Sharp Corporation. Electronic calculator with voice clock. 312,831, 12-11-90, Cl. D18-2.000.

Schroder-Jorgensen, Jorgen. Holder for dental tape. 312,894, 12-11-90, Cl. D28-64.000.

Schubert, Otto. Compact disc holder. 312,725, 12-11-90, Cl. D3-35.000.

Scott Paper Company: *See*—
Sigmund, Jerry A., 312,739, Cl. D6-523.000.

Seikosha Co., Ltd.: *See*—
Hirota, Kimio, 312,788, Cl. D10-10.000.
Imai, Tokiko, 312,800, Cl. D10-130.000.
Kato, Kayoko, 312,790, Cl. D10-26.000.
Kato, Kayoko, 312,798, Cl. D10-130.000.
Odaka, Seiji, 312,799, Cl. D10-130.000.
Takashima, Asao, 312,789, Cl. D10-25.000.

Severin Montres AG: *See*—
Ratajski, Michel P., 312,792, Cl. D10-32.000.

Sharp Corporation: *See*—
Kosako, Mikio; and Tatsuta, Youichi, 312,834, Cl. D18-37.000.
Sawada, Masaji; and Iida, Katsuhiro, 312,831, Cl. D18-2.000.

Sharp, Herbert G. Corner stay for a box. 312,783, 12-11-90, Cl. D9-434.000.

Shea, Roger D. Tunic. 312,721, 12-11-90, Cl. D2-212.000.

Sigmund, Jerry A., to Scott Paper Company. Jumbo toilet tissue dispenser. 312,739, 12-11-90, Cl. D6-523.000.

Silvey, Grant A. Head mountable exerciser. 312,855, 12-11-90, Cl. D21-191.000.

Sony Corporation: *See*—
Kobayashi, Masaharu, 312,824, Cl. D14-126.000.

Souter, Neil T., to S. G. Owen (Northampton), Ltd. Plating machine for depositing precious metals onto discrete components. 312,828, 12-11-90, Cl. D15-199.000.

Southco, Inc.: *See*—
Bisbing, Robert H., 312,769, Cl. D8-338.000.

Spectramed, Inc.: *See*—
Bradrick, Gary D.; and Guthrie, Robert B., 312,873, Cl. D24-25.000.

Splane, Eleanor A. Kitty litter box. 312,897, 12-11-90, Cl. D30-161.000.

Spock, Paul S., to Supelco Incorporated. Short-tube heatless concentrator. 312,875, 12-11-90, Cl. D24-29.000.

Spock, Paul S., to Supelco Inc. Long-tube heatless concentrator. 312,876, 12-11-90, Cl. D24-29.000.

SSMC Inc.: *See*—
Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., 312,905, Cl. D32-71.000.
Davidson, Donald R.; Creed, Gerald J.; and Rogers, Howard D., 312,906, Cl. D32-71.000.
Davidson. Donald R.; Creed, Gerald J.; and Rogers, Howard D., 312,907, Cl. D32-71.000.

Starck, Philippe, to Flos S.p.A. Table lamp. 312,891, 12-11-90, Cl. D26-106.000.

Sube, Minoru: *See*—
Ito, Masafumi; Hasegawa, Shigeru; Sube, Minoru; and Sato, Yuji, 312,825, Cl. D14-164.000.

Sun, Donald J. C.: *See*—
Anderson, Donald A.; and Sun, Donald J. C., 312,858, Cl. D21-219.000.

Sunagawa, Masao: *See*—
Miyata, Tomoyuki; Hasegawa, Kohichi; Sunagawa, Masao; Iwao, Akira; and Suzuki, Naruhiko, 312,901, Cl. D32-21.000.

Supelco Incorporated: *See*—
Spock, Paul S., 312,875, Cl. D24-29.000.
Spock, Paul S., 312,876, Cl. D24-29.000.

Suzuki, Naruhiko: *See*—
Miyata, Tomoyuki; Hasegawa, Kohichi; Sunagawa, Masao; Iwao, Akira; and Suzuki, Naruhiko, 312,901, Cl. D32-21.000.

Svee, Roy M., to J. B. Goodhouse, Inc. Photograph holder. 312,836, 12-11-90, Cl. D19-33.000.

Swadell, Robert A., to Geisha Corporation. Decorative outdoor marker lamp. 312,889, 12-11-90, Cl. D26-168.000.

Syracuse China Corporation: *See*—
Unger, Steve A., 312,750, Cl. D7-545.000.
Unger, Steve A., 312,752, Cl. D7-585.000.
Unger, Steve A., 312,753, Cl. D7-585.000.
Unger, Steve A., 312,754, Cl. D7-585.000.
Unger, Steve A., 312,755, Cl. D7-585.000.

Tacconelli, Ping L., to L'Oreal S.A. Combined bottle and closure. 312,774, 12-11-90, Cl. D9-352.000.

Tacconelli, Ping L., to L'Oreal S.A. Combined container and closure. 312,775, 12-11-90, Cl. D9-352.000.

Tacconelli, Ping L., to L'Oreal S.A. Combined bottle and closure. 312,776, 12-11-90, Cl. D9-371.000.

Tacconelli, Ping L., to L'Oreal S.A. Combined container and closure. 312,778, 12-11-90, Cl. D9-396.000.

Tacconelli, Ping L., to L'Oreal S.A. Combined bottle and closure. 312,779, 12-11-90, Cl. D9-403.000.

Takara Co., Inc.: *See*—
Kataoka, Isamu; Saitoh, Shinya; and Nakane, Shigeru, 312,850, Cl. D21-150.000.

Takara Co., Ltd.: *See*—
Kataoka, Isamu, 312,848, Cl. D21-150.000.
Kataoka, Isamu, 312,849, Cl. D21-150.000.
Kataoka, Isamu, 312,851, Cl. D21-150.000.
Matsuda, Takashi, 312,845, Cl. D21-104.000.

Takashima, Asao, to Seikosha Co., Ltd. Clock. 312,789, 12-11-90, Cl. D10-25.000.

Takemori, Hiroshi: *See*—
Kohama, Mitsuyoshi; Yamase, Shinichi; and Takemori, Hiroshi, 312,807, Cl. D12-110.000.

Takizawa, Takeshi, to Canare Electric Co., Ltd. Coaxial connector. 312,813, 12-11-90, Cl. D13-133.000.

Takizawa, Takeshi, to Canare Electric Co., Ltd. Coaxial connector. 312,814, 12-11-90, Cl. D13-133.000.

Taninaka, Tomoko, to Tomy Kogyo Co., Inc. Audible toy boat. 312,847, 12-11-90, Cl. D21-130.000.

Tatsuta, Youichi: *See*—
Kosako, Mikio; and Tatsuta, Youichi, 312,834, Cl. D18-37.000.

Teac Corporation: *See*—
Ito, Masafumi; Hasegawa, Shigeru; Sube, Minoru; and Sato, Yuji, 312,825, Cl. D14-164.000.

Thermalloy, Inc.: *See*—
Marshall, Larry D., 312,819, Cl. D13-179.000.

Tomy Kogyo Co., Inc.: *See*—
Taninaka, Tomoko, 312,847, Cl. D21-130.000.

TonJon Company, The: *See*—
Eberts, Allen F., 312,892, Cl. D28-12.000.

Toogood, Paul. Fish hook threader. 312,860, 12-11-90, Cl. D22-149.000.

'Totes', Incorporated: *See*—
Cain, Ann S., 312,724, Cl. D3-12.000.

Townsend, Ensley E.: *See*—
LaCourt, Michael W.; Townsend, Ensley E.; and Pfaff, Douglas J., 312,823, Cl. D14-121.000.

Transistolite Manufacturing Limited: *See*—
Liu, Kwok H., 312,884, Cl. D26-46.000.

Treadwell, May E. Seat cushion. 312,741, 12-11-90, Cl. D6-601.000.

Tremonti, Michael J., to 501 Hardware Design Inc. Door hardware. 312,761, 12-11-90, Cl. D8-305.000.

Tremonti, Michael J., to 501 Hardware Design Inc. Door pull. 312,763, 12-11-90, Cl. D8-316.000.

Tremonti, Michael J., to 501 Hardware Design Inc. Door pull. 312,764, 12-11-90, Cl. D8-317.000.

Tremonti, Michael J., to 501 Hardware Design Inc. Door hardware. 312,765, 12-11-90, Cl. D8-319.000.

Tremonti, Michael J., to 501 Hardware Design Inc. Door hardware. 312,766, 12-11-90, Cl. D8-319.000.

Tremonti, Michael J., to 501 Hardware Design Inc. Door hardware. 312,767, 12-11-90, Cl. D8-319.000.

Tropar Manufacturing Company, Inc.: *See*—
Ilaria, Peter V.; and Macowski, William, 312,801, Cl. D11-115.000.

Tucker, Terence. Beverage can cover. 312,785, 12-11-90, Cl. D9-447.000.

Turn-Luckily International, Inc.: *See*—
Huang, George Y., 312,816, Cl. D13-147.000.

Unger, Steve A., to Syracuse China Corporation. Serving plate or similar article. 312,750, 12-11-90, Cl. D7-545.000.

Unger, Steve A., to Syracuse China Corporation. Saucer or similar article. 312,752, 12-11-90, Cl. D7-585.000.

Unger, Steve A., to Syracuse China Corporation. Bowl or similar article. 312,753, 12-11-90, Cl. D7-585.000.

Unger, Steve A., to Syracuse China Corporation. Plate or similar article. 312,754, 12-11-90, Cl. D7-585.000.

Unger, Steve A., to Syracuse China Corporation. Saucer or similar article. 312,755, 12-11-90, Cl. D7-585.000.

V. & E. Friedland Limited: *See*—
Lomas, James R., 312,797, Cl. D10-118.000.

Vandendriessche, Jean-Pierre: *See*—
Boddin, Geert R.; Vandendriessche, Jean-Pierre; and Witdoek, Daniel C., 312,827, Cl. D15-30.000.

Ventura Travelware, Inc.: *See*—
Bialo, Walter, 312,728, Cl. D3-76.000.

Viennet, Jean-Pierre: *See*—
Benoit-Pequignet, Emile; and Viennet, Jean-Pierre, 312,791, Cl. D10-32.000.

Visual Communication Productions Inc.: *See*—
Coutta, John M., 312,830, Cl. D16-237.000.

Vitrac, Jean-Pierre, to Prodir S.A. Writing instrument. 312,838, 12-11-90, Cl. D19-51.000.

Vollrath Company, Inc, The: *See*—
Kessler, William L, 312,749, Cl. D7-395.000.

Watabe, Noboru; Watanabe, Toyoshi; Iwamoto, Masatoshi; and Ichihashi, Toru, to NEC Corporation. Portable computer. 312,822, 12-11-90, Cl. D14-106.000.

Watanabe, Toyoshi: *See*—
Watabe, Noboru; Watanabe, Toyoshi; Iwamoto, Masatoshi; and Ichihashi, Toru, 312,822, Cl. D14-106.000.

Wells, Mark B.: *See*—
Becker, Joseph S.; McAfee, Arthur J.; Wells, Mark B.; Kidd, Thomas C.; and Mullane, John C., Jr., 312,869, Cl. D23-415.000.

Wendell Brooks, Inc.: *See*—
Nemeth, Bradley M., 312,839, Cl. D19-75.000.

Westphal, Dennis; and Piles, Jonathan, to CertainTeed Corporation. Window component extrusion. 312,882, 12-11-90, Cl. D25-124.000.

Westvaco Corporation: *See*—
Rigby, William R., 312,781, Cl. D9-420.000.

Wherry, Dennis P.; O'Brien, Martin C.; Horian, Robert L.; and McPherson, Bruce M., to Calibron, Inc. Lawn sprinkler head. 312,864, 12-11-90, Cl. D23-214.000.

Wiseman, Richard A.: *See*—
Wiseman, Virginia; and Wiseman, Richard A., 312,852, Cl. D21-166.000.
Wiseman, Virginia B.; and Wiseman, Richard A., 312,853, Cl. D21-166.000.

Wiseman, Virginia; and Wiseman, Richard A. Tumbler toy. 312,852, 12-11-90, Cl. D21-166.000.

Wiseman, Virginia B.; and Wiseman, Richard A. Weightlifter toy. 312,853, 12-11-90, Cl. D21-166.000.

Witdoek, Daniel C.: *See*—
Boddin, Geert R.; Vandendriessche, Jean-Pierre; and Witdoek, Daniel C., 312,827, Cl. D15-30.000.

Wolff, Joan P., to Coats & Clark, Inc. Pie topper plate. 312,758, 12-11-90, Cl. D7-675.000.

Wolff, Joan P., to Coats & Clark, Inc. Pie topper plate. 312,759, 12-11-90, Cl. D7-675.000.

Worwag, Peter, to Dupro AG. Vacuum cleaner nozzle. 312,904, 12-11-90, Cl. D32-32.000.

Yamamoto, Takayuki, to Yazaki Corporation. Housing for an electrical connector. 312,815, 12-11-90, Cl. D13-147.000.

Yamase, Shinichi: *See*—
Kohama, Mitsuyoshi; Yamase, Shinichi; and Takemori, Hiroshi, 312,807, Cl. D12-110.000.

Yazaki Corporation: *See*—
Yamamoto, Takayuki, 312,815, Cl. D13-147.000.

Young, James K. Combined bottle and syringe support for use in insulin withdrawal. 312,870, 12-11-90, Cl. D24-8.000.

Younger, E. Max: *See*—
Younger, Ervin E.; Kickler, Gary M.; and Younger, E. Max, 312,842, Cl. D20-42.000.

Younger, Ervin E.; Kickler, Gary M.; and Younger, E. Max, to Nite-Glo Corp. Illuminated display sign. 312,842, 12-11-90, Cl. D20-42.000.

Zwang, Mouricio. Finger-gripping tool for use in eating food. 312,757, 12-11-90, Cl. D7-683.000.

501 Hardware Design Inc.: *See*—
Tremonti, Michael J., 312,761, Cl. D8-305.000.
Tremonti, Michael J., 312,763, Cl. D8-316.000.
Tremonti, Michael J., 312,764, Cl. D8-317.000.
Tremonti, Michael J., 312,765, Cl. D8-319.000.
Tremonti, Michael J., 312,766, Cl. D8-319.000.
Tremonti, Michael J., 312,767, Cl. D8-319.000.

LIST OF PLANT PATENTEES

Bailey, George A.; and Lintott, Kieth G., to Framptons Nurseries Ltd. Chrysanthemum plant named Yellow Fresco. 7,395, 12-11-90, Cl. 78.000.

Conard-Pyle Company, The: *See*—
Meilland, Alain A., 7,390, Cl. 20.000.

Florfis AG: *See*—
Schumann, Ingeborg, 7,391, Cl. 68.000.
Schumann, Ingeborg, 7,392, Cl. 68.000.
Schumann, Ingeborg, 7,393, Cl. 68.000.
Schumann, Ingeborg, 7,394, Cl. 68.000.

Framptons Nurseries Ltd.: *See*—
Bailey, George A.; and Lintott, Kieth G., 7,395, Cl. 78.000.

Lintott, Kieth G.: *See*—
Bailey, George A.; and Lintott, Kieth G., 7,395, Cl. 78.000.

Meilland, Alain A., to Conard-Pyle Company, The. Rose plant—Meirolour variety. 7,390, 12-11-90, Cl. 20.000.

Schumann, Ingeborg, to Florfis AG. Geranium plant named Fismanon. 7,391, 12-11-90, Cl. 68.000.

Schumann, Ingeborg, to Florfis AG. Geranium plant named Fisbal. 7,392, 12-11-90, Cl. 68.000.

Schumann, Ingeborg, to Florfis AG. Geranium plant named Fiscab. 7,393, 12-11-90, Cl. 68.000.

Schumann, Ingeborg, to Florfis AG. Geranium plant named Fisglo. 7,394, 12-11-90, Cl. 68.000.

CLASSIFICATION OF PATENTS

ISSUED DECEMBER 11, 1990

NOTE.—First number, class; second number, subclass; third number, patent number

CLASS 2

6 4,975,980
10 4,975,981
49 R 4,975,982
60 4,975,983
114 4,975,984
115 4,975,985
160 4,975,986
246 4,975,987

CLASS 4

243 4,975,990
251 4,975,988
300 4,975,989
579 4,975,991
599 4,975,992
601 4,975,993

CLASS 5

120 4,975,994
450 4,975,995
464 4,975,996
505 4,975,997

CLASS 8

115.6 4,976,741
412 4,976,742
527 4,976,744
543 4,976,743

CLASS 15

210 B 4,975,998
210 R 4,975,999
220 R 4,976,000
250.2 4,976,001
304 4,976,002
322 4,976,005
372 4,976,003
415.1 4,976,004

CLASS 16

238 4,976,006
302 4,976,007
354 4,976,008

CLASS 19

299 4,976,012

CLASS 24

129 R 4,976,013
421 4,976,014
429 4,976,015
433 4,976,016
585 4,976,017

CLASS 28

187 4,976,018

CLASS 29

26 A 4,976,019
90.01 4,976,020
91.1 4,976,021
227 4,976,022
523 4,976,023
527.6 4,976,024
563 4,976,025
714 4,976,026
727 4,976,027

CLASS 30

29.5 4,976,030
49 4,976,028
114 4,976,029
296.1 4,976,031
298 4,976,032
366 4,976,033
370 4,976,034

CLASS 33

1 A 4,976,035
23.03 4,976,036
27.03 4,976,037
233 4,976,038
285 4,976,039
372 4,976,040
392 4,976,041
501.14 4,976,044
536 4,976,042
537 4,976,045
551 4,976,043
640 4,976,046
735 4,976,047
767 4,976,048

CLASS 36

8.1 4,976,049
9 R 4,976,050

CLASS 37

94 4,976,051
109 4,976,052
231 4,976,053
235 4,976,054

CLASS 40

152.1 4,976,055
299 4,976,056
579 4,976,057
657 4,976,058

CLASS 42

46 4,976,059

CLASS 43

42.41 4,976,060
44.6 4,976,061
131 4,976,062

CLASS 44

301 4,976,745
330 4,976,746

CLASS 47

33 4,976,063
63 4,976,064

CLASS 48

127.9 4,976,747

CLASS 49

43 4,976,065
225 4,976,066
377 4,976,067
482 4,976,068
497 4,976,069

CLASS 51

101 R 4,976,070
168 4,976,071
266 4,976,072
410 4,976,073

CLASS 52

2 J 4,976,074
71 4,976,075
90 4,976,076
126.6 4,976,077
223 L 4,976,078
233 4,976,079
239 4,976,080
309.11 4,976,081
384 4,976,082
489 4,976,083
713 4,976,084
715 4,976,085
741 4,976,086
742 4,976,087
4,976,088

CLASS 53

53 4,976,089
448 4,976,090
467 4,976,091
475 4,976,092

CLASS 55

1 4,976,748
6 4,976,749
21 4,976,750
84 4,976,751
117 4,976,752
124 4,976,753
159 4,976,754
161 4,976,755
341.100 4,976,756
350 4,976,758
355 4,976,757
487 4,976,759
4,976,760

CLASS 56

11.3 4,976,093
330 4,976,094
350 4,976,095

CLASS 57

12 4,976,096
208 4,976,097
308 4,976,098
411 4,976,099

CLASS 60

39.02 4,976,100
39.12 4,976,101
226.1 4,976,102
299 4,976,103
412 4,976,104
413 4,976,105
452 4,976,106
660 4,976,108
670 4,976,107

CLASS 62

18 4,976,109
45.1 4,976,110
48.1 4,976,112
55.5 4,976,111
314 4,976,113
323.1 4,976,114
428 4,976,115
441 4,976,116
480 4,976,117

CLASS 65

3.2 4,976,761
30.1 4,976,764
33 4,976,765
107 4,976,762
287 4,976,763
289 4,976,766

CLASS 66

85 A 4,976,118

CLASS 68

242 4,976,119

CLASS 70

68 4,976,120
4,976,121
134 4,976,122
369 4,976,123
458 4,976,124

CLASS 71

26 4,976,767
76 4,976,768
86 4,976,769
88 4,976,770
90 4,976,771
92 4,976,772
94 Re.33,478
4,976,773
4,976,774
106 4,976,775

CLASS 72

21 4,976,125
83 4,976,126
95 4,976,127
238 4,976,128
247 4,976,129
269 4,976,130
347 4,976,131
416 4,976,132

CLASS 73

1.00 C 4,976,133
3 4,976,134
23.2 4,976,135
40.7 4,976,136
53 4,976,137
73 4,976,138
117.3 4,976,139
118.2 4,976,140
146 4,976,141
151.5 4,976,143
155 4,976,142
168 4,976,144
204.22 4,976,145
313 4,976,146
455 4,976,147
505 Re.33,479
579 4,976,148
597 4,976,149
644 4,976,150
730 4,976,151
852 4,976,152
861.03 4,976,153
861.06 4,976,154
861.19 4,976,155
861.24 4,976,156
4,976,157
862.07 4,976,158
862.21 4,976,159
864.17 4,976,161
865.9 4,976,162

CLASS 74

5.47 4,976,163
50 4,976,164
400 4,976,165
512 4,976,166
533 4,976,167
625 4,976,168
862.36 4,976,160
866 4,976,169
4,976,170
878 4,976,171

CLASS 75

254 4,976,778
255 4,976,777
363 4,976,779
375 4,976,780
483 4,976,776
710 4,976,781

CLASS 81

3.09 4,976,172
54 4,976,173
125 4,976,174
439 4,976,175

CLASS 82

113 4,976,176
147 4,976,177

CLASS 83

19 4,976,178
50 4,976,179
133 4,976,180

CLASS 84

422.3 4,976,181
462 4,976,182

CLASS 89

1.819 4,976,183
14.3 4,976,184
35.01 4,976,185

CLASS 91

166 4,976,186
173 4,976,187
369.2 4,976,188
476 4,976,189
535 4,976,190

CLASS 92

48 4,976,191
165 R 4,976,192
261 4,976,193

CLASS 99

328 4,976,194
391 4,976,195

CLASS 100

233 4,976,196

CLASS 101

137 4,976,197
459 4,976,198

CLASS 102

200 4,976,199
202.7 4,976,200
323 4,976,201
367 4,976,202
476 4,976,203

CLASS 106

19 4,976,782
20 4,976,783
277 4,976,784
287.17 4,976,785
416 4,976,786
441 4,976,787

CLASS 108

43 4,976,204
47 4,976,205

CLASS 110

171 4,976,206
214 4,976,207
234 4,976,208
4,976,209
246 4,976,210

CLASS 114

44 4,976,211
178 4,976,212
345 4,976,213

CLASS 116

100 4,976,214
215 4,976,215

CLASS 118

728 4,976,216
733 4,976,217

CLASS 119

15 4,976,219
18 4,976,220
20 4,976,221
60 4,976,222
61 4,976,223
148 4,976,224
168 4,976,218

CLASS 123

41.74 4,976,225
64 4,976,226
80 R 4,976,227
90.11 4,976,228
90.17 4,976,229
90.49 4,976,230
188 M 4,976,231
190 E 4,976,232
196 R 4,976,233
4,976,235
198 DC 4,976,234
339 4,976,237
4,976,238
399 4,976,239
406 4,976,240
425 4,976,241
489 4,976,242
492 4,976,243
501 4,976,244
506 4,976,245
509 4,976,246
651 4,976,247
659 4,976,248

CLASS 124

8 4,976,249
25 4,976,250

CLASS 125

13.01 4,976,251
300 4,976,236

CLASS 126

27 4,976,252
512 4,976,253

CLASS 128

4 4,976,254
24 A 4,976,255
64 4,976,256
78 4,976,257
200.18 4,976,259
200.24 4,976,260
207.15 4,976,261
402 4,976,262
421 4,976,263
4,976,264
634 4,976,265
659 4,976,266
660.01 4,976,267
687 4,976,268
754 4,976,269
760 4,976,270
764 4,976,271
774 4,976,272
844 4,976,273
849 4,976,274
860 4,976,275

CLASS 132

212 4,976,276
279 4,976,277

CLASS 134

5 4,976,788

CLASS 136

246 4,976,789

CLASS 137

15 4,976,278
107 4,976,279
315 4,976,280
460 4,976,281
504 4,976,283
512.4 4,976,284
580 4,976,282
588 4,976,285
625.43 4,976,286
801 4,976,287

CLASS 138

120 4,976,288
122 4,976,289
141 4,976,290
175 4,976,291

CLASS 139

194 4,976,292
383 AA 4,976,293

CLASS 140

102 4,976,294

CLASS 141

39 4,976,295
46 4,976,296
95 4,976,297

CLASS 144

249 B 4,976,298

CLASS 148

2 4,976,790
404 4,976,791
4,976,792

CLASS 149

19.4 4,976,795
19.5 4,976,794
21 4,976,793

CLASS 150

155 4,976,299

CLASS 152

454 4,976,300

CLASS 156

49 4,976,796
66 4,976,811
69 4,976,797
85 4,976,798
100 4,976,805
106 4,976,799
148 4,976,812
151 4,976,800
230 4,976,813
245 4,976,801
277 4,976,814
297 4,976,803
325 4,976,806
345 4,976,815
401 4,976,804
405.1 4,976,807
537 4,976,816
555 4,976,817
638 4,976,808
643 4,976,809
4,976,818
659.1 4,976,810

CLASS 160

84.1 4,976,301
310 4,976,302

CLASS 162

9 4,976,819
206 4,976,820
360.1 4,976,821
389 4,976,822

CLASS 164

29 4,976,303
428 4,976,304
458 4,976,305
476 4,976,306

CLASS 165

10 4,976,308
42 4,976,309
76 4,976,307
82 4,976,310

84 4,976,311
167 4,976,313

CLASS 166

117.5 4,976,314
270 4,976,315
291 4,976,316
311 4,976,318
321 4,976,317

CLASS 169

39 4,976,320
54 4,976,319

CLASS 174

35 GC 4,977,295
35 MS 4,977,296
258 4,977,297

CLASS 175

24 4,976,321
57 4,976,322
267 4,976,323
329 4,976,324
394 4,976,325

CLASS 177

145 4,976,326

CLASS 180

68.2 4,976,327
140 4,976,328
197 4,976,329
4,976,330
4,976,331
4,976,332

CLASS 181

115 4,976,333
207 4,976,334

CLASS 184

6.4 4,976,335

CLASS 187

8.5 4,976,336
51 4,976,337
110 4,976,338

CLASS 188

73.45 4,976,339

CLASS 190

109 4,976,340

CLASS 192

6 A 4,976,348
20 4,976,347

CLASS 194

200 4,976,346

CLASS 198

323 4,976,345
418.2 4,976,344
453 4,976,343
495 4,976,342
666 4,976,341

CLASS 200

5 A 4,977,298
5B 4,977,299
293 4,977,300

CLASS 202

158 4,976,823
172 4,976,824

CLASS 203

71 4,976,825

CLASS 204

12 4,976,826
15 4,976,827
28 4,976,828
38.7 4,976,829
58.4 4,976,830
92 4,976,835
98 4,976,831
4,976,832
157.69 4,976,834
181.7 4,976,833
4,976,836
4,976,837
182.3 4,976,838
192.17 4,976,839
202 4,976,840
243 M 4,976,841
252 4,976,842
298.36 4,976,843
408 4,976,844

CLASS 206

232 4,976,351
316.2 4,976,352
386 4,976,353
387 4,976,350
456 4,976,354
457 4,976,355

CLASS 208

39 4,976,845
114 4,976,846
120 4,976,847
251 H 4,976,848
351 4,976,849

CLASS 209

539 4,976,356

CLASS 210

86 4,976,851
4,976,852
104 4,976,850
107 4,976,853
168 4,976,854
242.3 4,976,855
490 4,976,856
493.5 4,976,857
496 4,976,858
500.23 4,976,859
500.28 4,976,860
508 4,976,861
608 4,976,863
610 4,976,864
635 4,976,865
637 4,976,867
638 4,976,866
640 4,976,868
644 4,976,869
656 4,976,862
668 4,976,870
709 4,976,871
739 4,976,872
744 4,976,873
755 4,976,874
788 4,976,875
791 4,976,876

CLASS 211

13 4,976,357
41 4,976,358
58 4,976,359
186 4,976,360

CLASS 212

231 4,976,361

CLASS 213

152 4,976,362
155 4,976,363

CLASS 215

229 4,976,364

CLASS 219

10.55 B 4,977,301
10.55 E 4,977,302
69.12 4,977,303
121.39 4,977,305
216 4,976,877
392 4,977,307
469 4,977,308
541 4,977,309

CLASS 220

1.5 4,976,365
4 B 4,976,366
260 4,976,367
268 4,976,368
270 4,976,369
306 4,976,370
315 4,976,371
335 4,976,373
453 4,976,374
534 4,976,375

CLASS 221

24 4,976,376

CLASS 222

55 4,976,377
4,976,378
83 4,976,379
103 4,976,380
207 Re.33,480
324 4,976,372
484 4,976,381

CLASS 224

42.23 4,976,384
42.42 4,976,385
42.45 R 4,976,386
103 4,976,382
215 4,976,383
262 4,976,387
264 4,976,388
328 4,976,389

CLASS 225

96 4,976,390

CLASS 226

196 4,976,391

CLASS 228

102 4,976,392
111 4,976,393

CLASS 229

117.14 4,976,394

CLASS 235

375 4,977,310

CLASS 236

11 4,976,459
12.12 4,976,460
13 4,976,461
345 4,976,462

CLASS 237

8 C 4,976,463
81 4,976,464

CLASS 239

224 4,976,465
265.29 4,976,466
298 Re.33,481
381 4,976,467
587 4,976,468
707 Re.33,482

CLASS 241

24 4,976,469
37 4,976,470
73 4,976,471
172 4,976,472

CLASS 242

67.1 R 4,976,473
107.7 4,976,474
115 4,976,475

CLASS 244

12.2 4,976,395
55 4,976,396
134 B 4,976,397
135 R 4,976,398
161 4,976,399
207 4,976,349

CLASS 248

118.3 4,976,407
446 4,976,408
469 4,976,409
514 4,976,410
524 4,976,411
634 4,976,412

CLASS 249

134 4,976,400
194 4,976,401

CLASS 250

201.8 4,977,311
208.1 4,977,304
4,977,312
4,977,313
211 R 4,977,314
221 4,977,315
231.13 4,977,316
239 4,977,317
253 4,977,318
255 4,977,319
288 4,977,320
311 4,977,321
327.2 4,977,322
332 4,977,323
396 ML 4,977,324
461.2 4,977,325
483.1 4,977,326
484.1 4,977,327
491.1 4,977,328
551 4,977,329
560 4,977,330
4,977,331

CLASS 251

1.3 4,976,402
121 4,976,404
129.16 4,976,405
214 4,976,403

CLASS 252

8.6 4,976,878
8.7 4,976,879
12 4,976,880
47 4,976,881
48.2 4,976,882
62 4,976,884
62.52 4,976,883
174.17 4,976,885
182.3 4,976,886
299.62 4,976,887
358 4,976,888
403 4,976,889
511 4,976,890

CLASS 254

95 4,976,413

CLASS 260

401 4,976,891
410.7 4,976,892
413 4,976,893

CLASS 261

64.1 4,976,894
108 4,976,895

CLASS 264

1.9 4,976,896
22 4,976,897
4,976,898
29.5 4,976,899
39 4,976,900
40.3 4,976,414
45.9 4,976,901
54 4,976,902
86 4,976,903
104 4,976,904
115 4,976,905
139 4,976,906
140 4,976,907
210.2 4,976,908
235 4,976,909
278 4,976,910

CLASS 267

25 4,976,417
136 4,976,415
177 4,976,416

CLASS 269

43 4,976,418

CLASS 270

45 4,976,419
54 4,976,420

CLASS 271

258 4,976,421

CLASS 272

56.555 4,976,422
72 4,976,423
73 4,976,424
128 4,976,425
130 4,976,426
131 4,976,427
134 4,976,428

CLASS 273

1 E 4,976,429
25 4,976,430
26 R 4,976,431
29 B 4,976,432
73 E 4,976,433
85 B 4,976,434
148 B 4,976,435
162 E 4,976,436
261 4,976,437
313 4,976,438
350 4,976,439
362 4,976,440
376 4,976,441
416 4,976,442
421 4,976,443

CLASS 277

53 4,976,444
198 4,976,446
231 4,976,445

CLASS 280

33.994 4,976,447
47.2 4,976,448
79.11 4,976,450
79.4 4,976,449
226.1 4,976,451
293 4,976,452
479.2 4,976,453
641 4,976,406
707 4,976,454
762 4,976,455

CLASS 283

70 4,976,456

CLASS 285

24 4,976,458
158 4,976,457

CLASS 292

92 4,976,476
201 4,976,477
4,976,478
343 4,976,479
353 4,976,480

CLASS 293

133 4,976,481

CLASS 294

92 4,976,483
102.1 4,976,482
119.1 4,976,484

CLASS 296

26 4,976,485
97.8 4,976,486
152 4,976,487
155 4,976,488
180.1 4,976,489
183 4,976,490
192 4,976,491

CLASS 297

31 4,976,492
410 4,976,493
464 4,976,494

CLASS 299

1 4,976,495
81 4,976,496

CLASS 301

37 R 4,976,497
95 4,976,498

CLASS 303

13 4,976,499
110 4,976,500
113 4,976,501

CLASS 307

4,977,332
243 4,977,333
260 4,977,334
272.2 4,977,335
290 4,977,336
446 4,977,337
4,977,338
475 4,977,339
520 4,977,340
572 4,977,341

CLASS 310

20 4,977,342
42 4,977,343
217 4,977,344
242 4,977,345

CLASS 312

322 4,976,502

CLASS 313

25 4,977,346
276 4,976,643
478 4,977,347
479 4,977,348
490 4,977,349
505 4,977,350

CLASS 315

87 4,977,351
111.81 4,977,352
130 4,977,353
248 4,977,354
368 4,977,355

CLASS 318

138 4,977,356
268 4,977,358
561 4,977,359
596 4,977,360
640 4,977,361
713 4,977,362
771 4,977,363

CLASS 320

21 4,977,364

CLASS 324

78 R 4,977,365
95 4,977,366
115 4,977,367
142 4,977,368
154 PB 4,977,369
158 F 4,977,370
158 T 4,977,371
166 4,977,372
209 4,977,373
254 4,977,374
511 4,977,375
613 4,977,376
640 4,977,377

CLASS 330

258 4,977,378

CLASS 331

56 4,977,379
74 4,977,380
111 4,977,381

CLASS 333

164 4,977,382
219 4,977,383

CLASS 335

210 4,977,384

CLASS 338

21 4,977,357
24 4,977,385
114 4,977,386
174 4,977,387

CLASS 340

436 4,977,388
461 4,977,389
521 4,977,390
522 4,977,391
568 4,977,392
636 4,977,393
679 4,977,394
683 4,977,395
706 4,977,396
710 4,977,397
793 4,977,398
825.440 4,977,399
932.2 4,977,400
975 4,977,401

CLASS 341

133 4,977,402
143 4,977,403
176 4,977,404

CLASS 342

162 4,977,405

CLASS 343

700 MS 4,977,406
753 4,977,407
792.5 4,977,408

CLASS 346

23 4,977,409
76 PH 4,977,410
108 4,977,411
4,977,412
140 R 4,977,413
154 4,977,414
155 4,977,415
4,977,416
160 4,977,417

CLASS 350

1.7 4,976,503
96.15 4,976,505
96.16 4,976,518
96.17 4,976,506
96.18 4,976,507
96.20 4,976,510
96.23 4,976,508
4,976,509
4,976,519
96.33 4,976,512
162.11 4,976,513
333 4,976,515
343 4,976,516
345 4,976,514
355 4,976,517
373 4,976,504
384 4,976,520
423 4,976,521
426 4,976,522
429 4,976,523
432 4,976,524
4,976,525
463 4,976,526
588 4,976,527
635 4,976,528

CLASS 351

41 4,976,529
44 4,976,530
156 4,976,531
158 4,976,532
160 R 4,976,533
161 4,976,534
214 4,976,535

CLASS 353

77 4,976,536

CLASS 354

63 4,977,418
76 4,977,419
79 4,977,420
246 4,977,421
317 4,977,422
402 4,977,423
410 4,977,424
474 4,977,425

CLASS 355

27 4,977,437
33 4,977,426
245 4,977,428
260 4,977,429
274 4,977,430
289 4,977,431
298 Re.33,484
309 4,977,432

CLASS 356

1 4,976,537
4 4,976,538
5 4,976,539
38 4,976,540
300 4,976,541
346 4,976,542
375 4,976,543
394 4,976,544
446 4,976,545

CLASS 357
16 4,977,433
22 4,977,434
23.5 4,977,435
38 4,977,438
49 4,977,439
68 4,977,440
70 4,977,441
4,977,442
82 4,977,443
4,977,444
236 4,977,436

CLASS 358
17 4,977,445
60 4,977,446
B1 4,864,390
66 4,977,447
75 4,977,448
86 4,977,449
98 4,977,450
108 4,977,451
138 4,977,452
4,977,453
141 4,977,454
142 4,977,455
213.13 4,977,456
227 4,977,457
296 4,977,459
336 4,977,460
4,977,461
339 4,977,462
448 4,977,463
4,977,464
456 4,977,458

CLASS 360
33.1 4,977,465
73.08 4,977,466
74.1 4,977,467
75 4,977,468
77.01 4,977,469
77.040 4,977,470
77.08 4,977,471
78.140 4,977,472
96.3 Re.33,483
130.24 4,977,473
132 4,977,474
133 4,977,475

CLASS 361
18 4,977,476
98 4,977,477
160 4,977,478
220 4,977,479
283 4,977,480
287 4,977,481
321 4,977,485
366 4,977,482
424 4,977,483
429 4,977,484

CLASS 362
27 4,977,486
32 4,977,487
84 Re.33,485
183 4,977,488
184 4,977,489
221 4,977,490

CLASS 363
15 4,977,491
41 4,977,492
126 4,977,493

CLASS 364
167.01 4,977,494
200 4,977,495
4,977,496
4,977,497
4,977,498
4,977,499
4,977,500
401 4,977,501
405 4,977,502
410 4,977,503
413.13 4,977,504
413.19 4,977,505
424.05 4,977,506
4,977,507
426.02 Re.33,486
431.08 4,977,508
449 4,977,509
463 4,977,510
473 4,977,511
474.37 4,977,512
483 4,977,513
487 4,977,514
492 4,977,515
508 4,977,516
510 4,977,517
519 4,977,519
521 4,977,518
4,977,520
525 4,977,521
526 4,977,522
550 4,977,523
562 4,977,524
565 4,977,525
567 4,977,526
571.03 4,977,527
571.04 4,977,528
578 4,977,529
579 4,977,530
580 4,977,531
708 4,977,532
726 4,977,533
748 4,977,534
4,977,535
900 4,977,536
4,977,537

CLASS 365
49 4,977,540
189.11 4,977,541
207 4,977,542
218 4,977,543
230.03 4,977,538

CLASS 366
162 4,976,546
169 4,976,547

CLASS 367
7 4,977,544
124 4,977,545
140 4,977,546
157 4,977,547

CLASS 368
10 4,977,548
277 4,976,548

CLASS 369
13 4,977,549
32 4,977,550
44.11 4,977,539
44.14 4,977,552
44.25 4,977,551
44.26 4,977,553
215 4,977,554

CLASS 370
29 4,977,555
60 4,977,556
85.6 4,977,557
112 4,977,558

CLASS 371
57.1 4,977,559

CLASS 372
2 4,977,560
23 4,977,561
32 4,977,562
4,977,563
4,977,564
4,977,565
33 4,977,566
45 4,977,567
46 4,977,568
50 4,977,569
4,977,570
54 4,977,571
69 4,977,572
81 4,977,573
93 4,977,574
103 4,977,575

CLASS 373
93 4,977,576

CLASS 374
56 4,976,549

CLASS 375
1 4,977,577
4,977,578
10 4,977,579
97 4,977,580
107 4,977,581
118 4,977,582

CLASS 376
221 4,976,911
249 4,976,912
381 4,976,913
391 4,976,914

CLASS 377
8 4,977,583
58 4,977,584

CLASS 378
4 4,977,585
61 4,977,586
99 4,977,587
196 4,977,588

CLASS 379
58 4,977,589
395 4,977,590
410 4,977,591
428 4,977,592

CLASS 380
2 4,977,593
4 4,977,594
24 4,977,595
48 4,977,596

CLASS 381
11 4,977,597
43 4,977,598
4,977,599
71 4,977,600

CLASS 382
4 4,977,601
27 4,977,602
34 4,977,603
42 4,977,604
51 4,977,605

CLASS 384
298 4,976,550
448 4,976,551

CLASS 388
811 4,976,552

CLASS 392
380 4,977,306

CLASS 400
124 4,976,553
4,976,554
314.1 4,976,555
320 4,976,556
565 4,976,557
615.2 4,976,558
691 4,976,559

CLASS 401
65 4,976,560
75 4,976,561
123 4,976,562
176 4,976,563
206 4,976,564

CLASS 403
8 4,976,565
374 4,976,566
407.1 4,976,567

CLASS 404
26 4,976,568

CLASS 405
59 4,976,569
79 4,976,570
261 4,976,571

CLASS 409
132 4,976,572
138 4,976,573
232 4,976,574
233 4,976,575

CLASS 411
121 4,976,576
271 4,976,577
512 4,976,578

CLASS 414
146 4,976,579
254 4,976,580
257 4,976,581
729 4,976,582
786 4,976,583
789.6 4,976,584

CLASS 415
118 4,976,585
143 4,976,586

CLASS 416
230 4,976,587

CLASS 417
20 4,976,588
34 4,976,589
53 4,976,590
254 4,976,591
295 4,976,592
476 4,976,593
538 4,977,606

CLASS 418
61.3 4,976,594
171 4,976,595

CLASS 419
8 4,976,915
25 4,976,916
33 4,976,917

CLASS 420
546 4,976,918

CLASS 422
7 4,976,919
23 4,976,920
28 4,976,921
34 4,976,922
58 4,976,923
61 Re.33,487
99 4,976,924
100 4,976,925
101 4,976,926
102 4,976,927
148 4,976,928
174 4,976,929
186.3 4,976,930
211 4,976,931
240 4,976,932

CLASS 423
21.1 4,976,939
210 4,976,933
4,976,934
222 4,976,935
242 4,976,936
4,976,937
247 4,976,941
249 4,976,938
294 4,976,942
336 4,976,943
347 4,976,944
450 4,976,945
490 4,976,946
502 4,976,947
607 4,976,948
648.1 4,976,940

CLASS 424
1.1 4,976,949
4,976,950
7.1 4,976,951
47 4,976,952
4,976,953
52 4,976,954
53 4,976,955
70 4,976,956
88 4,976,957
92 4,976,958
94.2 4,976,959
195.1 4,976,960
401 4,976,961
424 4,976,962
438 4,976,963
450 4,976,964
456 4,976,965
473 4,976,966
4,976,967
491 4,976,968
672 4,976,969
705 4,976,970

CLASS 425
62 4,977,608
117 4,976,596
126.2 4,976,597
131.1 4,976,599
135 4,976,598
151 4,976,600
182 4,976,601
188 4,976,602
556 4,976,603

CLASS 426
2 4,976,971
3 4,976,972
7 4,976,973
14 4,976,974
36 4,976,975
69 4,976,976
96 4,976,977
295 4,976,978
427 4,976,979
495 4,976,980
512 4,976,981
557 4,976,982
594 4,976,983
602 4,976,984

CLASS 427
27 4,976,986
38 4,976,987
42 4,976,988
48 4,976,989
98 4,976,990
125 4,976,991
131 4,976,992
161 4,976,993
230 4,976,994
251 4,976,995
255.5 4,976,996
284 4,976,998
380 4,976,997
420 4,976,999
424 4,977,000

CLASS 428
34.6 4,977,001
34.7 4,977,002
35.5 4,977,003
35.7 4,977,008
36.7 4,977,004
36.92 4,977,005
42 4,977,006
76 4,977,007
83 4,977,010
152 4,977,011
209 4,977,012
212 4,977,013
220 4,977,014
221 4,977,015
225 4,977,016
229 4,977,017
314.4 4,977,018
317.5 4,977,019
323 4,977,020
329 4,977,021
349 4,977,022
367 4,977,023
404 4,977,024
421 4,977,025
422 4,977,026
423.9 4,977,027
426 4,977,028
429 4,977,029
447 4,977,030
463 4,977,031
483 4,977,032
516 4,977,033
548 4,977,034
550 4,977,035
553 4,977,036
577 4,977,037
610 4,977,038
623 4,977,039
692 4,977,040

CLASS 429
26 4,977,041
49 4,977,042
54 4,977,043
76 4,977,009
104 4,977,044
192 4,977,045
194 4,977,046

CLASS 430
2 4,977,047
22 4,977,048
49 4,977,049
57 4,977,050
58 4,977,051
98 4,977,052
106.6 4,977,053
108 4,977,054
114 4,977,055
115 4,977,056
138 4,977,057
4,977,058
4,977,059
203 4,977,060
264 4,977,061
4,977,062
4,977,063
270 4,977,064
271 4,977,065
277 4,977,066
398 4,977,067
495 4,977,068
506 4,977,069
510 4,977,070
534 4,977,071
549 4,977,072
4,977,073
567 4,977,074
4,977,075
583 4,977,076

CLASS 431
1 4,976,604
27 4,976,605
79 4,976,606
174 4,976,607
202 4,976,608
326 4,976,609

CLASS 432
11 4,976,610
181 4,976,611
239 4,976,612
241 4,976,613

CLASS 433
18 4,976,614
75 4,976,615
77 4,976,616
118 4,976,625
141 4,976,617
215 4,976,618

CLASS 434
16 4,976,619
81 4,976,620
94 4,976,621
127 4,976,622
247 4,976,623

CLASS 435
7 4,977,077
4,977,078
4,977,079
28 4,977,080
70.21 4,977,081
71.1 4,977,082
71.3 4,977,083
78 4,977,084
212 4,977,085
240.27 4,977,086
240.47 4,977,087
252.3 4,977,088
252.31 4,977,089
266 4,977,090
271 4,977,091
320 4,977,092

CLASS 436
119 4,977,093
157 4,977,094
178 4,977,095

CLASS 437
2 4,977,096
4 4,977,097
31 4,977,098
44 4,977,100
51 4,977,101
52 4,977,099
4,977,102
105 4,977,103
162 4,977,104
190 4,977,105
192 4,977,106
225 4,977,107
229 4,977,108

CLASS 439
67 4,976,626
70 4,976,624
100 4,976,627
101 4,976,628
259 4,976,629
260 4,976,630
535 4,976,631
571 4,976,633
580 4,976,632
589 4,976,634
849 4,976,635

CLASS 440
1 4,976,636
47 Re.33,488
49 4,976,637
57 4,976,638
59 4,976,639
61 4,976,640

CLASS 441
023 4,976,641
131 4,976,642

CLASS 445
50 4,976,644

CLASS 446
15 4,976,645
74 4,976,646
151 4,976,647
207 4,976,648
220 4,976,649
418 4,976,650
421 4,976,651
488 4,976,652

CLASS 450
155 4,976,653

CLASS 452
110 4,976,011
116 4,976,010
198 4,976,009

CLASS 455
10 4,977,607
89 4,977,609
120 4,977,610
161 4,977,611
166 4,977,612
182 4,977,613
193 4,977,614
277 4,977,615
4,977,616
319 4,977,617
607 4,977,618
4,977,619
619 4,977,620

CLASS 460
80 4,976,654

CLASS 464
16 4,976,655
68 4,976,656

CLASS 474
13 4,976,657
49 4,976,658
111 4,976,659
135 4,976,660

138 4,976,661
205 4,976,662
242 4,976,663

CLASS 475

80 4,976,664
4,976,665
83 4,976,666
86 4,976,667
221 4,976,668
248 4,976,669
278 4,976,670
299 4,976,671

CLASS 493

130 4,976,672
194 4,976,673
195 4,976,674
295 4,976,675
365 4,976,676
413 4,976,677

CLASS 494

68 4,976,678

CLASS 501

7 4,977,110
95 4,977,111
97 4,977,112
98 4,977,113
104 4,977,114
107 4,977,115
128 4,977,116

CLASS 502

26 4,977,117
35 4,977,118
48 4,977,119
64 4,977,120
66 4,977,121
69 4,977,122
84 4,977,123
174 4,977,124
200 4,977,125
242 4,977,126
309 4,977,127
328 4,977,128
330 4,977,129
351 4,977,130

CLASS 503

201 4,977,131
220 4,977,132
226 4,977,133
227 4,977,134
4,977,135
4,977,136

CLASS 505

1 4,977,109

CLASS 514

6 4,977,137
10 4,977,138
11 4,977,139
12 4,977,140
19 4,977,141
23 4,977,142
25 4,977,143
46 4,977,144
91 4,977,145
99 4,977,146
171 4,977,147
183 4,977,148
210 4,977,149
220 4,977,150
225.5 4,977,151
232.8 4,977,152
237.5 4,977,153
250 4,977,155
254 4,977,154
255 4,977,156
258 4,977,157
285 4,977,158
292 4,977,159
293 4,977,160
302 4,977,161
314 4,977,162
317 4,977,163
318 4,977,164
4,977,165
323 4,977,166
326 4,977,167
330 4,977,168
346 4,977,169
352 4,977,170
365 4,977,171
374 4,977,172
376 4,977,173
382 4,977,174
394 4,977,175
397 4,977,176
410 4,977,177
418 4,977,178
423 4,977,179
4,977,180
4,977,181
4,977,182
425 4,977,183
452 4,977,184
473 4,977,185
479 4,977,186

560 4,977,187
575 4,977,188
603 4,977,189
951 4,977,190

CLASS 521

48 4,977,191
56 4,977,192
85 4,977,193
99 4,977,194
155 4,977,195
182 4,977,196

CLASS 522

14 4,977,197
25 4,977,198
31 4,977,199

CLASS 523

223 4,977,200
400 4,977,201
414 4,977,202
420 4,977,203

CLASS 524

186 4,977,204
496 4,977,205
504 4,977,206
507 4,977,207
515 4,977,208
594 4,977,209

CLASS 525

53 4,977,210
54.31 4,977,211
57 # 4,977,212
66 4,977,213
109 4,977,214
119 4,977,215
183 4,977,216
286 4,977,217
329.3 4,977,218
329.5 4,977,219
332.3 4,977,220
356 4,977,221
359.3 4,977,222
432 4,977,223
471 4,977,224

CLASS 526

93 4,977,225
122 4,977,226

CLASS 527

400 4,977,227

CLASS 528

12 4,977,228
26 4,977,229
125 4,977,230
142 4,977,231
185 4,977,232
198 4,977,233
211 4,977,234
220 4,977,235
226 4,977,236
230 4,977,237
4,977,238
310 4,977,239
493 4,977,240
497 4,977,241
499 4,977,242

CLASS 530

35 4,977,245
208 4,977,243
350 4,977,244
383 4,977,246
387 4,977,247
412 4,977,248

CLASS 534

696 4,977,249

CLASS 536

21 4,977,250
27 4,977,251
102 4,977,252
118 4,977,253
124 4,977,254

CLASS 540

4 4,977,255
205 4,977,257
227 4,977,256
548 4,977,258

CLASS 544

69 4,977,259
73 4,977,260
199 4,977,261
221 4,977,262
329 4,977,263
334 4,977,264
363 4,977,265
398 4,977,266

CLASS 546

20 Re.33,489
272 4,977,267

CLASS 548

110 4,977,268
262.4 4,977,269
314 4,977,270
328 4,977,271
336 4,977,272
339 4,977,273
455 4,977,274
539 4,977,275

CLASS 549

58 4,977,276
215 4,977,277
227 4,977,278
274 4,977,279
343 4,977,280
373 4,977,281
412 4,977,282
484 4,977,283
508 4,977,284
529 4,977,285

CLASS 552

4 4,977,286

CLASS 556

83 4,977,287
87 4,977,288
454 4,977,289
459 4,977,290
466 4,977,291

CLASS 558

81 4,977,292
153 4,977,293
208 4,977,294

CLASS 560

159 4,976,679

CLASS 600

7 4,976,680
17 4,976,681

CLASS 604

4 4,976,682
29 4,976,683
51 4,976,684
52 4,976,685
61 4,976,686
65 4,976,687
95 4,976,688
4,976,689
96 4,976,690
4,976,691
101 4,976,692

110 4,976,693
132 4,976,695
140 4,976,694
154 4,976,696
164 4,976,697
174 4,976,698
180 4,976,700
192 4,976,699
4,976,701
198 4,976,702
247 4,976,703
265 4,976,704
304 4,976,705
4,976,706
408 4,976,707
4,976,708

CLASS 606

5 4,976,709
15 4,976,710
48 4,976,711
59 4,976,712
62 4,976,713
4,976,714
64 4,976,258
77 4,976,715
107 4,976,716
119 4,976,717
131 4,976,718
151 4,976,719
157 4,976,721
4,976,722
170 4,976,723
182 4,976,724
192 4,976,725
194 4,976,720
216 4,976,726
223 4,976,727

CLASS 623

3 4,976,729
4,976,730
4 4,976,731
6 4,976,732
11 4,976,733
4,976,734
12 4,976,735
16 4,976,736
4,976,737
4,976,738
4,976,739
22 4,976,728
23 4,976,740

CLASS 756

273.5 4,976,802

D1—	101	312,719		585	312,752		447	312,785		154	312,817			312,849		124	312,882
	122	312,720			312,753	D10—	2	312,786		156	312,818			312,850	D26—	20	312,883
D2—	212	312,721			312,754			312,787		179	312,819			312,851		46	312,884
	314	*312,722*			312,755		*10*	*312,788*	D14—	*100*	*312,821*		*166*	*312,852*		*60*	*312,885*
	318	312,723		610	312,756		25	312,789		106	312,822			312,853		63	312,886
D3—	12	312,724		675	312,758		26	312,790		121	312,823		189	312,854		65	312,887
	35	312,725			312,759		32	312,791		126	312,824		191	312,855			312,888
	36	312,726		683	312,757			312,792		135	312,826		*201*	*312,856*		*69*	*312,890*
	74	312,727	D8—	29	312,760		39	312,793		164	312,825		210	312,857		106	312,891
	76	312,728		305	312,761		53	312,794		240	312,820		219	312,858		168	312,889
D4—	104	312,729		308	312,762		*62*	*312,795*	D15—	30	312,827	D22—	132	312,859	D28—	12	312,892
	115	312,730		316	312,763		64	312,796		199	312,828		149	312,860		*46*	*312,861*
D5—	45	312,731		317	312,764		118	312,797	D16—	214	312,829	D23—	209	312,862		48	312,893
		312,732		319	312,765		130	312,798		237	312,830			312,863		64	312,894
		312,733			312,766			*312,799*	D18—	*2*	*312,831*		*214*	*312,864*	D30—	129	312,895
D6—	335	312,734			312,767			312,800		4	312,832			312,865		130	312,896
		312,735		338	312,769	D11—	115	312,801		7	312,833		255	312,866		161	312,897
	349	312,736		354	312,770		118	312,802		37	312,834		281	312,867		162	312,898
	415	*312,737*		373	312,771	D12—	96	*312,805*	D19—	33	*312,835*		377	*312,868*	D32—	*8*	*312,899*
	446	312,738		389	312,772		98	312,806			312,836		415	312,869		14	312,900
	523	312,739		395	312,773		110	312,807		34.1	312,841	D24—	8	312,870		21	312,901
	536	312,740	D9—	338	312,768		114	312,808		51	312,837		10	312,871		24	312,902
	601	*312,741*		*352*	*312,774*		133	312,803			312,838			312,872			312,903
		312,742			312,775		147	312,809		75	312,839		25	312,873		32	312,904
D7—	309	312,743		371	312,776		196	312,804		90	312,840		28	312,874		71	312,905
	317	312,744		375	312,777		*203*	*312,810*	D20—	42	*312,842*		29	*312,875*			312,906
		312,745		396	312,778		307	312,811	D21—	59	312,843			312,876			312,907
	337	312,746		403	312,779	D13—	120	312,812		65	312,844		45	312,877	D34—	2	312,908
	358	312,751		412	312,780		133	312,813		104	312,845		47	312,878		34	312,909
	367	312,747		420	312,781			*312,814*		*108*	*312,846*		*51*	*312,879*		*42*	*312,910*
		312,748		432	312,782		147	312,815		130	312,847		53	312,880			312,911
	395	312,749		434	312,783			312,816		150	312,848	D25—	113	312,881	D99—	29	312,912
	545	312,750			312,784												

CLASSIFICATION OF PLANTS

P.—	20	7,390		68	7,391			7,392			7,393			7,394		78	7,395

GEOGRAPHICAL INDEX

OF RESIDENCE OF INVENTORS

(U.S. States, Territories and Armed Forces, the Commonwealth of Puerto Rico, and the Canal Zone)

Alabama	1	Kentucky	21	Oregon	41
Alaska	2	Louisiana	22	Pennsylvania	42
American Samoa	3	Maine	23	Puerto Rico	43
Arizona	4	Maryland	24	Rhode Island	44
Arkansas	5	Massachusetts	25	South Carolina	45
California	6	Michigan	26	South Dakota	46
Canal Zone	7	Minnesota	27	Tennessee	47
Colorado	8	Mississippi	28	Texas	48
Connecticut	9	Missouri	29	Utah	49
Delaware	10	Montana	30	Vermont	50
District of Columbia	11	Nebraska	31	Virginia	51
Florida	12	Nevada	32	Virgin Islands	52
Georgia	13	New Hampshire	33	Washington	53
Guam	14	New Jersey	34	West Virginia	54
Hawaii	15	New Mexico	35	Wisconsin	55
Idaho	16	New York	36	Wyoming	56
Illinois	17	North Carolina	37	U.S. Air Force	57
Indiana	18	North Dakota	38	U.S. Army	58
Iowa	19	Ohio	39	U.S. Navy	59
Kansas	20	Oklahoma	40		

(First number in listing denotes location according to above key. Refer to patent number in body of the Official Gazette to obtain details as to inventor name, location, etc.)

PATENTS

01 : 4,976,447
4,976,734
4,976,789
04 : 4,975,987
4,976,093
4,976,619
4,976,651
4,976,710
4,977,048
4,977,107
4,977,111
4,977,379
4,977,381
4,977,509
4,977,590
4,977,613
05 : 4,976,062
4,977,316
06 : Re.33,478
Re.33,479
Re.33,486
4,975,990
4,975,992
4,975,995
4,976,002
4,976,003
4,976,033
4,976,057
4,976,061
4,976,072
4,976,163
4,976,176
4,976,178
4,976,208
4,976,220
4,976,222
4,976,231
4,976,235
4,976,257
4,976,259
4,976,276
4,976,285
4,976,318
4,976,351
4,976,354
4,976,364
4,976,367
4,976,381
4,976,386
4,976,388
4,976,392
4,976,424
4,976,428

4,976,435
4,976,440
4,976,450
4,976,451
4,976,456
4,976,506
4,976,507
4,976,530
4,976,531
4,976,562
4,976,587
4,976,612
4,976,614
4,976,618
4,976,620
4,976,629
4,976,647
4,976,653
4,976,689
4,976,691
4,976,694
4,976,702
4,976,709
4,976,716
4,976,720
4,976,724
4,976,725
4,976,731
4,976,732
4,976,737
4,976,740
4,976,753
4,976,758
4,976,772
4,976,798
4,976,809
4,976,816
4,976,817
4,976,824
4,976,842
4,976,848
4,976,857
4,976,866
4,976,901
4,976,927
4,976,935
4,976,938
4,976,949
4,976,966
4,976,987
4,976,996
4,977,002
4,977,010

4,977,013
4,977,014
4,977,044
4,977,077
4,977,092
4,977,108
4,977,164
4,977,220
4,977,270
4,977,296
4,977,329
4,977,330
4,977,332
4,977,334
4,977,352
4,977,357
4,977,361
4,977,374
4,977,378
4,977,382
4,977,384
4,977,385
4,977,398
4,977,402
4,977,403
4,977,416
4,977,432
4,977,449
4,977,455
4,977,471
4,977,472
4,977,484
4,977,494
4,977,502
4,977,503
4,977,519
4,977,540
4,977,566
4,977,572
4,977,575
4,977,577
4,977,585
4,977,609
4,977,610
4,977,618
08 : 4,976,000
4,976,043
4,976,050
4,976,065
4,976,131
4,976,156
4,976,204
4,976,352

4,976,368
4,976,406
4,976,439
4,976,590
4,976,790
4,977,433
4,977,440
4,977,514
4,977,549
09 : 4,976,028
4,976,152
4,976,159
4,976,261
4,976,301
4,976,410
4,976,599
4,976,747
4,976,782
4,976,852
4,976,904
4,976,990
4,977,178
4,977,315
4,977,546
4,977,619
12 : 4,975,993
4,976,085
4,976,124
4,976,201
4,976,215
4,976,271
4,976,311
4,976,348
4,976,357
4,976,371
4,976,379
4,976,418
4,976,528
4,976,532
4,976,623
4,976,641
4,976,715
4,976,863
4,976,913
4,977,004
4,977,082
4,977,297
4,977,345
4,977,380
4,977,407
4,977,422
4,977,527
4,977,530

4,977,545
4,977,589
4,977,614
13 : Re.33,481
4,976,323
4,976,596
4,976,733
4,976,786
4,976,788
4,976,822
4,976,958
4,977,021
4,977,037
4,977,191
4,977,231
15 : 4,976,036
4,976,041
4,976,487
16 : 4,976,224
17 : Re.33,480
4,976,008
4,976,013
4,976,017
4,976,055
4,976,058
4,976,211
4,976,221
4,976,281
4,976,360
4,976,362
4,976,373
4,976,441
4,976,533
4,976,621
4,976,637
4,976,639
4,976,640
4,976,683
4,976,687
4,976,767
4,976,811
4,976,871
4,976,898
4,976,956
4,976,972
4,976,977
4,977,093
4,977,095
4,977,119
4,977,141
4,977,243
4,977,251
4,977,277

4,977,292
4,977,392
4,977,477
4,977,505
4,977,582
4,977,592
4,977,612
4,977,616
18 : 4,975,984
4,976,167
4,976,186
4,976,225
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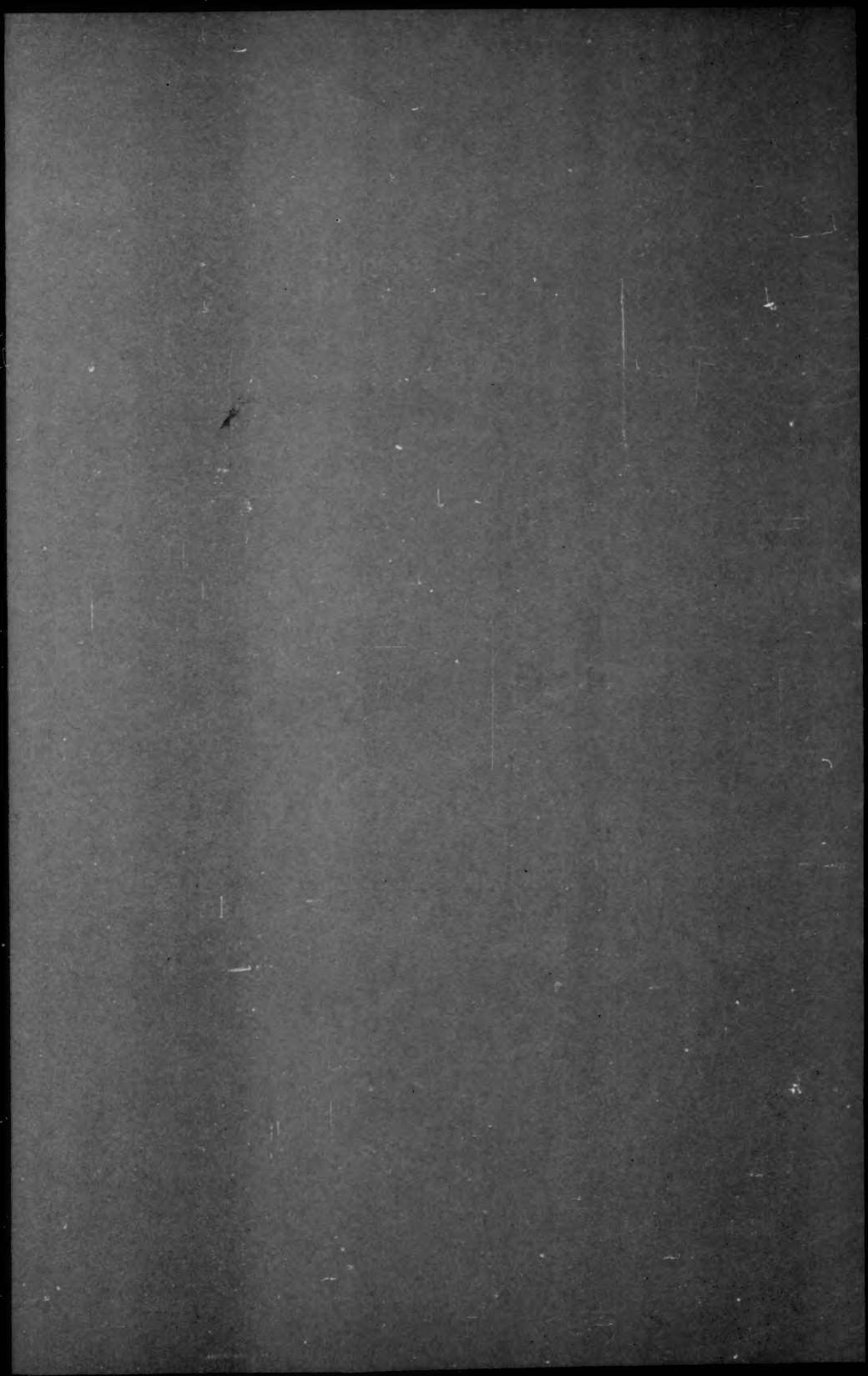

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